Dixon Sand

Old Northern Road Quarry, Maroota

Annual Review
2020 – 2021



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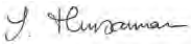
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Appendix B – PM10, TSP and Weather Station Reports

Appendix C – Groundwater and Surface Water Monitoring Data

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Appendix F – Truck Movement Data

Appendix G – Bush Regeneration Report

Appendix H – Annual Biodiversity & Rehabilitation Management Report

Appendix I – S94 Contribution

Appendix J – Community Engagement and CCC Meeting Minutes

Appendix K – Complaint Register

Appendix L – Waste Register

Appendix M – RFS Meeting Minutes

Abbreviations

796/00/HE	Development Consent 796/00/HE for the Old Northern Road quarry,
Annual Review	This document (also formerly known as 'Annual Environmental Management Report')
DA250-09-01	Development Consent DA250-09-01 for the Old Northern Road quarry
DA165-7-2005	Development Consent DA165-7-2005 for the Haerses Road quarry
Dixon Sand	Dixon Sand Pty Ltd
DRG	Department of Planning, Industry and Environment – Resources Regulator (now MEG)
DPIE	Department of Planning, Industry and Environment
DPIE (Resources Regulator)	Department of Planning, Industry and Environment – Resources Regulator
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	NSW *Environment Planning and Assessment Act* 1979
EPL3916	Environment Protection Licence 3916 for the Old Northern Road quarry
HRBOA	Biodiversity Offset Area, located at Haerses Road Quarry (for Old Northern Road DA250-09-01)
IEA	Independent Environmental Audit
MEDM	Maximum Extraction Depth Map
MEG	Mining, Exploration and Geoscience, within the Department of Regional NSW
MTSGS	Maroota Tertiary Sands Groundwater Source
NVC	Native Vegetation Corridor, located at Old Northern Road Quarry
PIRMP	Pollution Incident Response Management Plan
PM10	Particulate matter <10µm
SCBGS	Sydney Central Basin Groundwater Source
TEOM	Tapered Element Oscillating Microbalance
TSP	Total suspended particulates
WAL	Water Access License

1. Statement of Compliance

Table 1: Statement of Compliance

All Conditions of the relevant approval(s) were complied with?		
Old Northern Road Quarry	DA250-09-01	No
	EPL3916	Yes
	WAL 24325	Yes
	WAL 24341	Yes
	WAL 43270	Yes

Table 2: Non-compliances

Relevant Approvals	Condition #	Condition description (summary)	Compliance Status	Section addressed in Annual Review
DA 250-09-01	Cond. 3 of Sch.3	Exceedance of daytime noise criteria at a number of receivers	Exceedance of criteria. Incident not considered as a Non-compliance	Table 35, Section 11.1
EPL 3916	Cond. L4.1			
	Cond. L4.2			
DA 250-09-01	Cond. 10 of Sch.5	Late notification of noise exceedance	Non-compliant	Table 35, Section 11.1

Compliance Status Key		
Risk Level	Colour code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: • Potential for serious environmental consequences, but is unlikely to occur, or • Potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • Potential for moderate environmental consequences, but is unlikely to occur, or • Potential for low environmental consequences, but is likely to occur
Administrative non-compliances	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

2. Introduction

2.1 Project Background

Dixon Sand Pty Ltd (Dixon Sand) operates two sand quarries on the Old Northern Road (Lots 29 and 196 DP 752025 and Lots 1 and 2 DP 547255) and on Haerses Road (Lot 170 DP 664766, Lot 170 DP 664767, Lots A and B DP 407341, Lots 176 and 177 DP 752039 and Lot 216 DP 752039) in Maroota, New South Wales. The quarry sites are located approximately 40 kilometres north of Parramatta. The locations of the quarries are shown in Figure 1.

Extraction commenced on Lots 29 and 196, DP752025 at Old Northern Road quarry in the early 1980s, with Dixon Sand undertaking extraction from 1992 to December 1998. The continued approval for extraction on Lots 29 and 196 was granted by the Land and Environment Court NSW on 7 July 2000 with subsequent multiple Modification applications being lodged. Current extraction operations occur on Lot 196, 1 and 2, with materials being processed at the central processing plant, stockpiled and sold to the market on Lot 196.

Extraction commenced at the Haerses Road quarry in 2006 with current extraction operations in Stages 1 and 2, and Cell 1A. Sand is being transferred to the Old Northern Road quarry for processing, product blending and sales. Products are also permitted to be sold directly to the market from Haerses Road quarry.

Environmental Monitoring locations for Old Northern Road Quarry are shown in Figure 2.

2.2 Scope of this document

The objective of this Annual Review is to report on the overall environmental performance, management of the operations and compliance of Old Northern Road Quarry with the consent conditions issued by the Secretary of NSW Department of Planning, Industry and Environment (DPIE). The reporting period is from 01 July 2020 to 30 June 2021, based on the date of the original quarry development consent 796/00/HE. Reporting for the rehabilitation assessment and ecological monitoring extends outside the specified period due to seasonal timing requirement for the surveys.

Development consent DA250-09-01 (Modification 5) is applicable to this Annual Review.

The following consent conditions outline the requirement of the Annual Review:

Schedule 5 of Condition 12 of DA250-09-01 (Modification 5) states:

By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant must submit a review to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must:

- *(a) describe the development (including any progressive rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;*
- *(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:*
    - *relevant statutory requirements, limits or performance measures/criteria;*
    - *requirements of any plan or program required under this consent;*

- *monitoring results of previous years; and*
- *relevant predictions in the documents listed in condition 2(a) of Schedule 2;*

(c) evaluate and report on:

- *the effectiveness of the air quality and noise management systems; and*
- *compliance with the performance measures, criteria and operating conditions in this consent.*

(d) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;

(e) identify any trends in the monitoring data over the life of the development;

(f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies;

(g) escribe what measures will be implemented over the current calendar year to improve the performance of the development.

The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 8 of Schedule 5) and any interested person upon request.

Dixon Sand requested approval from the DPIE for the submission deadline of the Annual Review to be adjusted to reflect the financial year reporting. Approval was granted by the DPIE on 9 February 2018 to submit the Annual Review by the end of September each year.

This Annual Review will report on the environmental performance in relation to the requirements of DA250-09-01 (Modification 5), Environment Protection License (EPL) # 3916 and Water Access Licenses (WALs) 24325, 24341 and 43270. The Annual Review has been prepared in accordance with *Post-approval requirements for State Significant mining developments – Annual Review Guideline* (DP&E, October 2015).

2.3 Old Northern Road Quarry Approvals

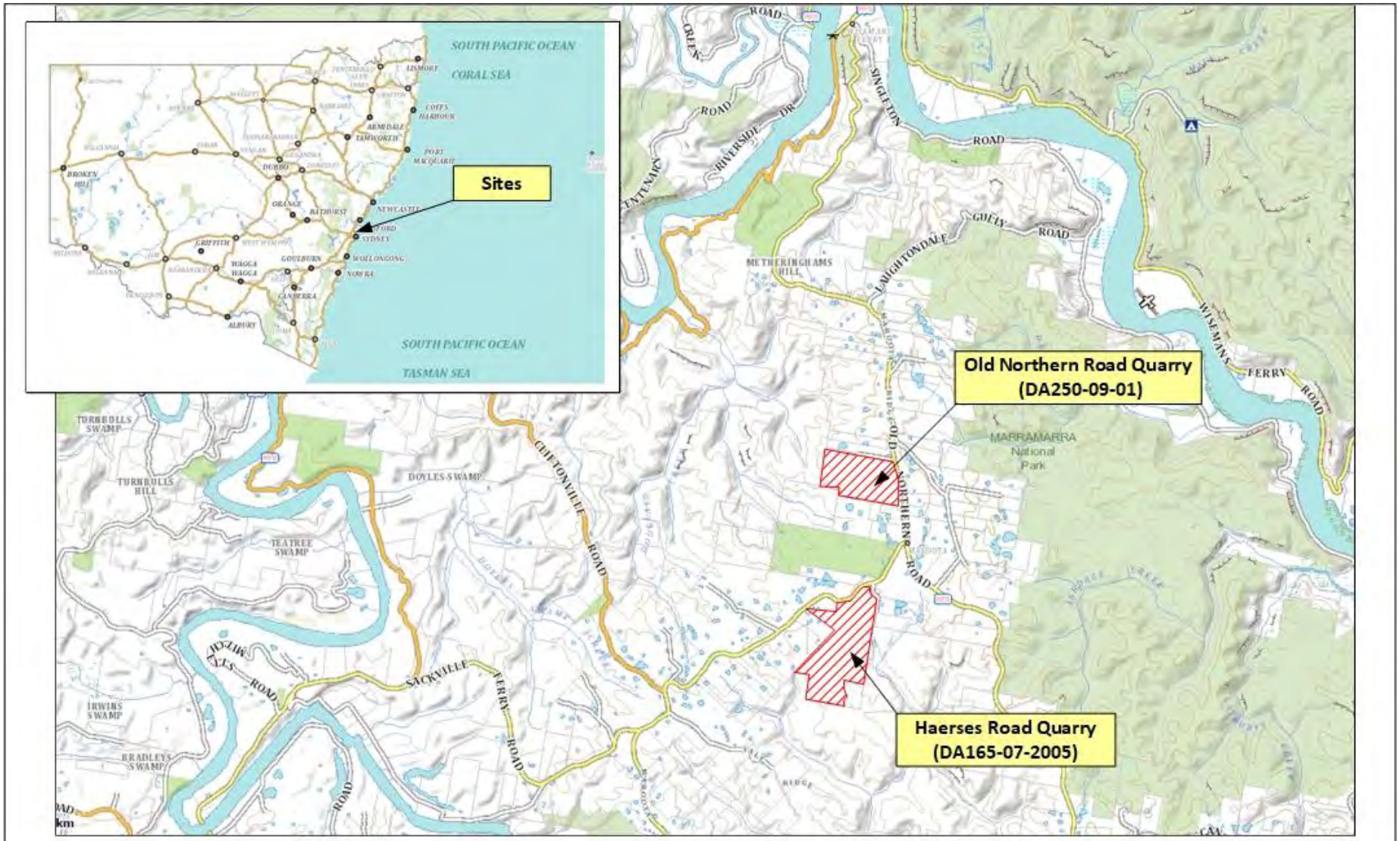
Development consents for the quarry on Lots 29 and 196 and extension into Lots 1 and 2 were issued by the Land and Environment Court on 7 July 2000 (796/00/HE) and 24 May 2004 (DA250-09-01), respectively. Consent No. 796/00/HE allowed for sand extraction, processing, and rehabilitation within Lots 29 and 196. This consent lapsed on the 22 of March 2010. Continued extraction on Lots 29 & 196 has been encompassed in DA250-09-01, which now forms a single integrated consent for all activities within Lots 1 & 2, and Lots 29 & 196. Extraction of Lot 29 has completed with the area currently being utilised for sediment basins, haul road and undergoing rehabilitation.

Continued use of the central processing plant on Lot 196, transport of product from the site, water management, and rehabilitation operations are approved under DA250-09-01.

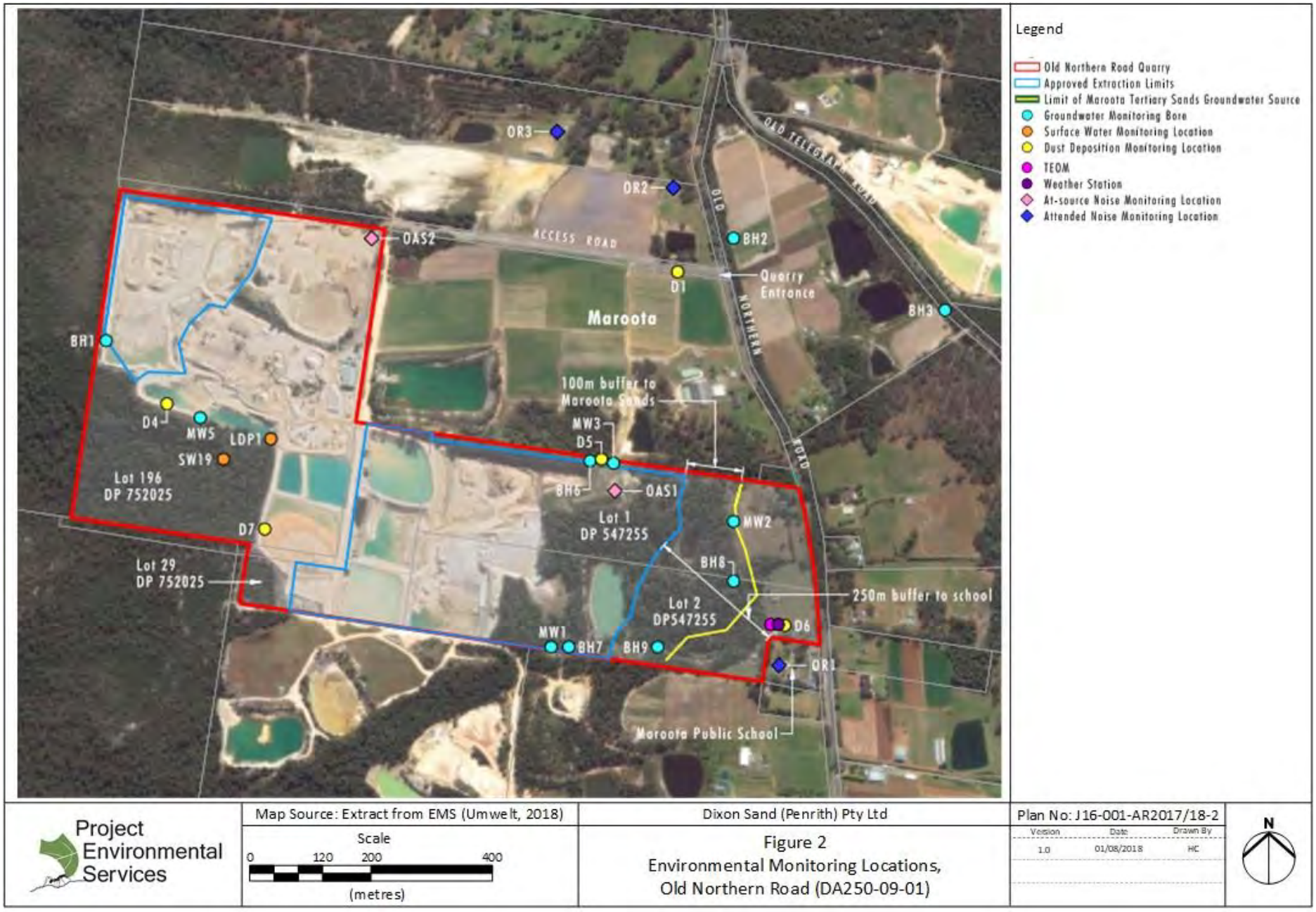
Five modifications to DA250-09-01 have been lodged and approved. Modification 5 is current and was approved on 14 November 2018. A summary of the development consents and modifications is provided in Table 3.

Table 3: Summary of Old Northern Road Quarry Development Consents and Modifications

Development Consents	Status	Date of Determination	Comments
Old Northern Road Quarry			
796/00/HE	Approved and superseded by DA250-09-01	7 July 2000	Approval for sand extraction, processing and rehabilitation of Lots 29 and 196, Old Northern Road.
DA250-09-01	Approved and superseded by Modification 1	2 January 2003	Continual of sand extraction on Lot 29 and 196, and the extension of extraction operations into Lots 1 and 2.
DA250-09-01 Modification 1	Approved and superseded by Modification 2	14 February 2006	Haerses Road sand to be transported and processed at the main Processing Plant on Lot 196 at the Old Northern Road
DA250-09-01 Modification 2	Approved and superseded by Modification 3	20 August 2008	Increased truck movements from 120 to 180 per day
DA250-09-01 Modification 3	Approved and superseded by Modification 4	30 August 2012	Amended DA250-09-01 to include extraction on Lots 29 and 196 Permit the extraction of Lot 196 to a level not within 2 metres of the wet weather high groundwater table Surrender of DA796/00/HE issued by the Land and Environment Court
DA250-09-01 Modification 4	Approved and superseded by Modification 5	6 July 2015	Application to include additional extraction areas on Lots 1 and 2 for extraction
DA250-09-01 Modification 5	Approved and current	17 November 2017	Application to extend the life of the quarry to 24 May 2042. Revision and update of the consent conditions in line with modern development consent format



Project Environmental Services	Map Source: Sixmap (2016) Scale 0 120 200 400 (kilometres)	Dixon Sand (Penrith) Pty Ltd Figure 1 Locality Plan of the Old Northern Road and Haerses Road Quarries	Plan No: J16-001-AR2017/18-1 Version: 1.0 Date: 01/08/2019 Drawn By: HC



Project Environmental Services

3. Operations Summary

3.1 Production and Vehicle Movements

All bulk sand truck movements from the Haerses Road site since commencement of extraction in November 2006 have delivered raw product to the Old Northern Road site for processing. Direct sale of products from Haerses Road Quarry commenced in 2015 under a separate development consent DA165-7-2005.

A total of **425,945.75** tonnes of sand and sandstone products have been exported from the Old Northern Road quarry during the 2020 – 2021 reporting period. Out of the total annual production figure, **57,504.1 tonnes** were sandstone products such as landscaping logs, boulders, slabs and rocks. A total of **52,870** tonnes of materials have been extracted from Haerses Road and transferred to Old Northern Road for processing in **1,430** truckloads (laden) during this reporting period.

The record of morning truck movement data and a sample of the daily truck record are contained in Appendix F.

Table 4 provides a summary of the annual production quantities, transfers and truck movements for Old Northern Road Quarry during the reporting period.

Table 4: Production Data, Transfers & Truck Movements at Old Northern Road Quarry.

Month	Total combined Production ONR from Lots 1, 2, 29 and 196 and HR (t)	Total Production of Haerses Rd Products (processed and sold at ONR) (t)	Total Transfers from Haerses Rd to ONR (t)	Max Daily Truck Movements at ONR	Max Daily Transfer from HR to ONR inbound (laden)	Max No. Trucks 5:45 -7:00 am at ONR (laden + unladen)
Jul 2020	30,031.11	2,592.3	4,544.0	140	10	28
Aug 2020	32,307.83	2,719.5	4,792.5	152	10	34
Sep 2020	37,885.46	3,423.4	5,786.5	156	12	28
Oct 2020	36,674.60	2,920.7	5,005.5	166	15	34
Nov 2020	39,156.32	3,749.2	6,638.5	180	14	34
Dec 2020	35,531.21	3,664.8	5,857.5	176	19	38
Jan 2021	35,403.40	2,453.2	4,224.5	180	13	40
Feb 2021	34,667.61	3,061.7	4,331.0	168	11	36
Mar 2021	35,148.25	2,603.3	2,870.0	180	18	38
Apr 2021	39,032.39	3,281.5	4,725.0	178	28	36
May 2021	36,848.56	3,206.8	2,275.0	158	18	36
Jun 2021	35,259.01	3,033.2	1,820.0	168	18	28
Totals / Maximum	**425,945.75**	**36,709.6**	**52,870.0**	**180**	**28**	**20**
Annual Limit	**495,000**	**190,000**	**190,000**			
			Daily Max Criteria	**180**	**28**	**40**

3.2 Submission of Quarry Production Data to DRG

Condition 13 of Schedule 2 of DA 250-09-01 requires Dixon Sand to submit calendar year annual production data to the DRG (now MEG) using the standard form and include a copy of this data in the Annual Review.

The DRG (now MEG) Minerals Return forms require reporting of extractive materials for the financial year, and not for the calendar year as specified in the consent condition above.

The Minerals Return form for the financial year 2019 – 2020 was submitted to DRG (now MEG) on 20 October 2020. During the period of this Annual Review, Dixon Sand is awaiting the 2020 – 2021 Mineral Return form to be supplied. The same production data contained in Table 4 will form the basis for calculations for MEG Minerals Return reporting. The forms will be completed and submitted to the DRG within the specified deadline.

4. Actions Required from Previous Annual Review

The proposed recommendations contained in the previous 2019-2020 Annual Review and Resources Regulator's Improvement Notice have been actioned by Dixon Sand and are summarised in Table 5.

Table 5: Summary of Recommendations and Actions

Recommendation from the 2019 – 2020 Annual Review	Actions
Vegetation Clearing and Extraction	
• Vegetation clearing will be undertaken in accordance with the Pre-clearing procedures.	• No vegetation clearing undertaken during this reporting period.
Rehabilitation and bush regeneration	
Old Northern Road Quarry • Rehabilitation will continue in the Native vegetation Corridor (NVC) on Lot 29 and the western embankment at the front gate.	• Actioned – continued rehabilitation in the NVC on Lot 29 with planting of propagated threatened species, weed management and general maintenance.
• Propagation of threatened species from the original, translocated and planted specimens	• Actioned – continued threatened species propagation in commercial nurseries.
• Removal of plant guards and timber stakes will be undertaken as planted specimens establish.	• Actioned – plant guards and timber stakes have been removed where deemed appropriate.

Haerses Road Biodiversity Offset Area (HRBOA) • Weed management on the edge of the HRBOA. • Maintenance of erosion and sediment control infrastructure.	 • Actioned - continued and on-going weed management on the edge perimeter of the HRBOA. • Actioned - erosion and sediment control infrastructure maintenance undertaken.

5. Environmental Performance

5.1 Air Quality

5.1.1 Dust Sources and Mitigation Measures

The objectives, criteria limits, procedures, response, reporting and responsibilities of air quality management are contained in the Air Quality Management Plan.

The following potential sources of dust generated from Old Northern Road Quarry and mitigation measures have been identified in Table 6.

Table 6: Potential sources of dust and mitigation measures.

Potential Dust Sources	Mitigation Measures
• topsoil stripping; • ripping with a bulldozer; • extraction with an excavator and truck; • crushers and screens at the processing plant; • wind erosion from stockpiles; • loading sand products into trucks; • vehicle movement and haulage on site; • product transportation along unsealed haul roads; and • occasional haul road grading.	• minimising the area of disturbance by only clearing areas immediately prior to extraction; • progressive rehabilitation; • maintaining dust suppression equipment to all processing plant; • maintaining a manual sprinkler system including fine sprays on the conveyors of the dry processing plant, overhead sprinklers and a conical jet stockpile sprinkler; • stabilising topsoil stockpiles by planting with a cover crop of non-invasive cereal or legumes; • using a water cart to suppress dust on unsealed roads, during dry conditions on days of operation; • limiting vehicle speed to 20 km/hr on internal unsealed access tracks; • ensuring all loads leaving the site are covered; and • regularly maintaining mobile and fixed equipment to minimise exhaust emissions.

5.1.2 Compliance Limits

Condition 8 of Schedule 3, DA250-09-01 requires Dixon Sand to operate a continuous air quality monitoring system to minimise the impacts at sensitive receivers such as the Maroota Public School. The following air quality criteria are to be complied with:

- dust deposition - 4g/m²/month (annual average) or 2g/m²/month increase;
- total suspended particulate matter (TSP) – 90µg/ m³ (annual mean); and
- particulate matter <10µm (PM10):
    - 50 µg/m³ (average for 24-hour period)
    - 30 µg/m³ (annual mean).

The NSW Environment Protection Authority (EPA) also requires the automatic alarm system of the Tapered Element Oscillating Microbalance (TEOM) continuous dust monitoring device to be set at a PM10 trigger value which triggers specific dust mitigation measure:

- 42 µg/m³ (average for rolling 24-hour period for wind directions between 270° and 315°) for the Old Northern Road quarry

Table 7 lists the relevant PM10 and Total suspended particulates (TSP) criteria as required by the Development Consent and Environment Protection Licence.

Table 7: PM10 and TSP Criteria.

Source	Condition	Criteria / Trigger Value	Comments
Old Northern Road			
DA250-09-01	Sch. 3, Cond. 7	30 µg/m^3	Annual PM_{10} average – long term impact assessment
		50 µg/m^3	24-hour PM_{10} average – short term impact assessment
EPL3916	O3.3	37 µg/m^3	Trigger value for PM_{10} automatic alarm
EPL3916	M2.4	42 µg/m^3 with prevailing wind direction from 270º - 315º	Criteria for enacting management plan strategies to notify the EPA, reduce dust emissions immediately and cease operations in Lots 1 and 2.
DA250-09-01	Sch. 3, Cond. 7	90 µg/m^3	Annual average criteria for TSP

5.1.3 Results

Climatic Data

Monthly climatic measurements were recorded by the weather station located adjacent to the Maroota Public School, in accordance with:

- Condition M4.1 of the EPL 3916,

These results are shown in Table 8.

Table 8: Monthly Total Rainfall and Averaged Temperatures.

Month	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021
Ave Temp (ºC)	11.8	12.2	15.8	17.8	19.9	19.7	21.4	20.3	19.3	16.7	14.2	11.7
Total Rainfall (mm)	161.8	52.2	33	103.6	46.8	133	43.8	55.4	341.6	12.2	68.4	38.6

Data presented in Table 8 shows that the highest monthly rainfall of 341.6 mm was recorded in March 2021 and the lowest monthly rainfall of 12.2 mm was recorded in April 2021. The total annual rainfall recorded during this reporting period is 1090.4 mm, representing a higher annual rainfall than the previous 5 reporting periods (313.2 mm for 2019-2020, 165.2 mm for 2018-2019, 372.8 mm in 2017-2018, 924 mm in 2016-2017 and 1026.4 mm in 2015-2016).

From the recorded monthly temperature data, January 2021 experienced the highest average temperature at 21.4°C with June 2021 experiencing the lowest average temperature at 11.7°C.

Fluctuations in temperatures and rainfalls are generally influenced largely by the El-Nino and La-Nina climatic cycle.

Dust Deposition

Five dust deposition gauges are located on the Old Northern Road Quarry. Table 9 lists the locations of the dust gauges.

Table 9: Site location of dust deposition gauges

Dust Gauge I.D.	Location Reference	Quarry Site
D01A	Quarry Access Road, near the Old Northern Road	Old Northern Road
D04	Rehabilitation Area	Old Northern Road
D05	Bundwall, Lot 1	Old Northern Road
D06	Maroota Public School	Old Northern Road
D07	Mulloc Heap	Old Northern Road

Dust deposition results are collected and analysed monthly by a NATA accredited laboratory. Table 10 presents the monthly dust deposition results between July 2020 and June 2021. Table 11 contains the calculated annual averages for the dust deposition gauges.

The monthly laboratory results for dust deposition for this reporting period are presented in Appendix A.

Table 10: Dust Deposition Results: July 2020 – June 2021.

Dust Gauge Location	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
DA1A Front Gate	1.2	3.0	2.0*	0.8*	0.7	5.2*	5.5*	2.8*	1.1*	7.5*	1.9	4.3*
D4 Rehab	0.1	0.2	0.3	0.2*	0.4	1.1*	0.5	1.1*	0.5	0.5	1.0	2.4*
D5 Bundwall	1.5	1.6*	1.5*	3.3*	0.9	4.4*	1.3*	3.1*	1.0*	1.6	1.2	0.5
D6 School	3.3*	1.1	0.8*	0.5*	0.7	1.3	1.0*	1.2*	1.8*	1.4*	1.5*	0.5*
D7 Mulloc Heap	0.1	0.3	0.4	0.4	0.4	1.0	0.8*	1.5*	0.5	0.4	0.9	0.3

Note:

x.x*	Vegetation / algae present in dust gauge
x.x*	Insects / Spider web present in dust gauge
x.x*	Bird dropping present in dust gauge
x.x*	Ash present in dust gauge
x.x*	Sand present in dust gauge
x.x*	Dust present in dust gauge

Table 11: Calculated Annual Averages of Dust Deposition: June 2020 – June 2021.

Dust Gauge Location	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
DA1A Front Gate	1.2	2.1	2.1	1.8	1.5	2.2	2.6	2.7	2.5	3.0	2.9	3.0
D4 Rehab	0.1	0.2	0.2	0.2	0.2	0.4	0.4	0.5	0.5	0.5	0.5	0.7
D5 Bundwall	1.5	1.6	1.5	2.0	1.8	2.2	2.1	2.2	2.1	2.0	1.9	1.8
D6 School	3.3	2.2	1.7	1.4	1.3	1.3	1.2	1.2	1.3	1.3	1.3	1.3
D7 Mulloc Heap	0.1	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.6

Charts 1 to 4 illustrate the annual average dust deposition results for the reporting periods of 2017-2018, 2018-2019, 2019-2020 and 2020-2021 respectively.

TEOM PM_{10} and TSP

In accordance with Condition 8 of Schedule 3, DA250-09-01, the concentration of particulates with an aerodynamic diameter less than ten microns (PM_{10}) is monitored via the continuous dust monitor (TEOM) near Maroota Public School. The TEOM records data for the whole 360º angles, of which the 270º - 315º quadrat (westerly to north-westerly) indicate potential dust contributions from the Old Northern Road Quarry. Chart 8 illustrates the PM_{10} results for this reporting period, in comparison with relevant consent criteria. Charts 5 to 8 show the PM_{10} results for the reporting periods of 2017-2018, 2018-2019, 2019-2020 and 2020-2021 respectively.

Two PM10 exceedance events occurred during this reporting period. Of the two exceedances, both events exceeded the EPL rolling 24-hour average PM10 of 42 ug/m3, with one event also exceeded the NEPM 50 ug/m3 criteria.

Reporting of TSP results commenced in December 2017 and are shown in Charts 9 to 12. No TSP exceedance occurred during this reporting period.

A copy of the full reports containing TEOM, TSP and weather station data provided by CBased Environmental Pty Ltd are contained in Appendix B.

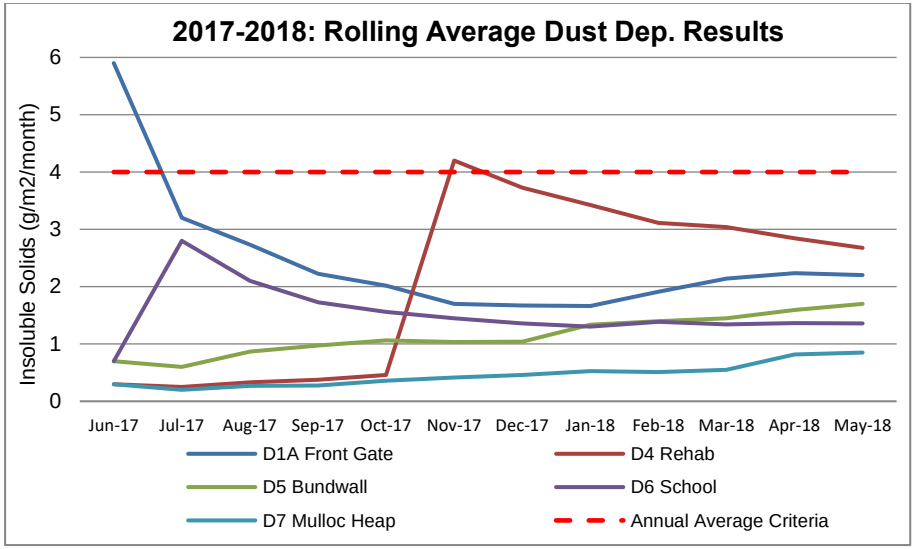


Chart 1: 2017 – 2018 Rolling Average of Dust Deposition Results

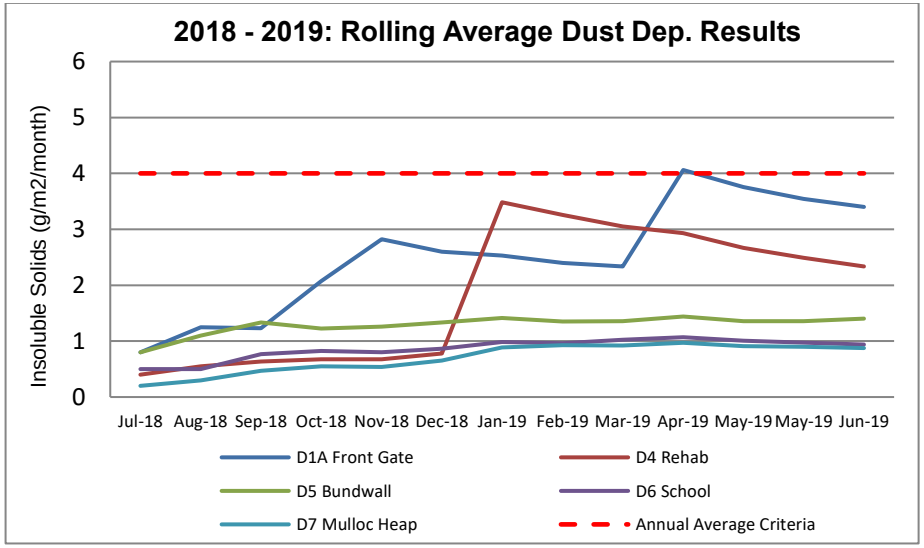


Chart 2: 2018 – 2019 Rolling Average of Dust Deposition Results

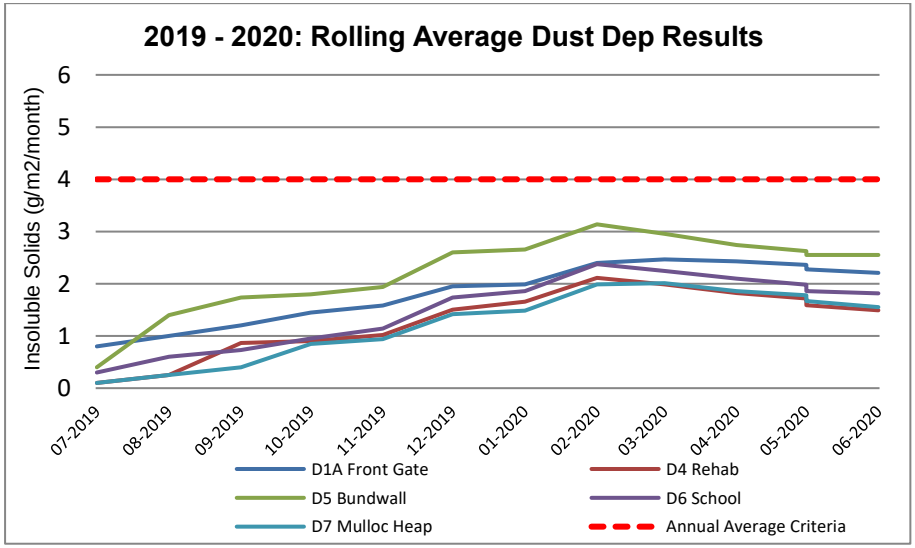


Chart 3: 2019 – 2020 Rolling Average of Dust Deposition Results

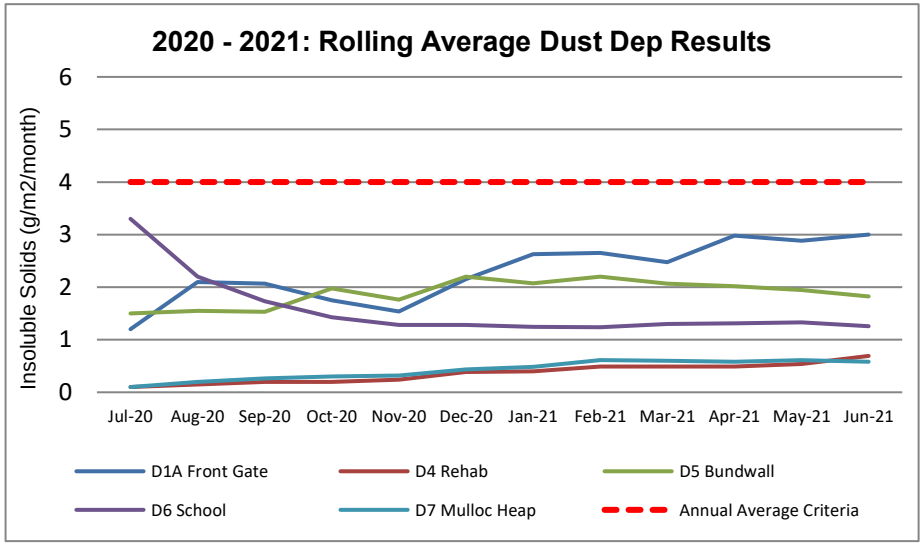


Chart 4: 2020 – 2021 Rolling Average of Dust Deposition Results

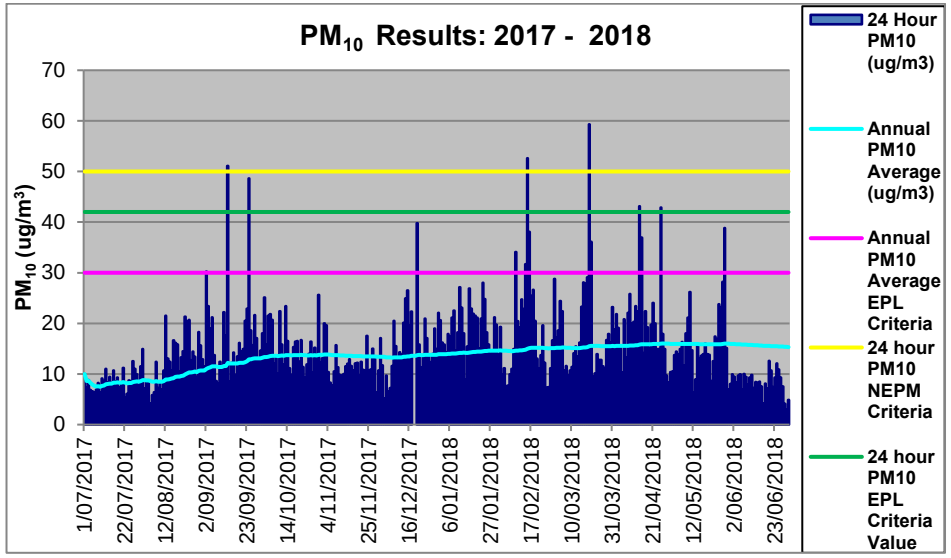


Chart 5: 2017-2018 PM10 Results and Criteria

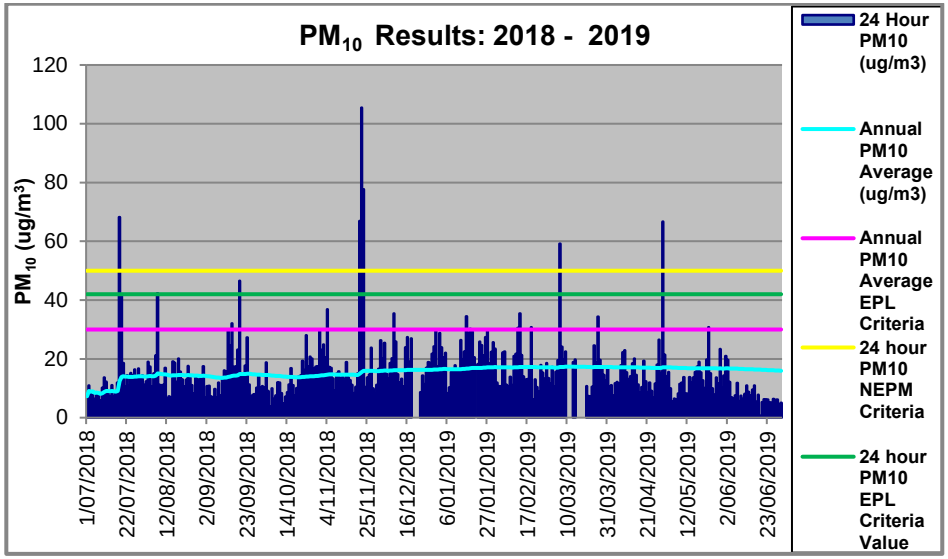


Chart 6: 2018-2019 PM10 Results and Criteria

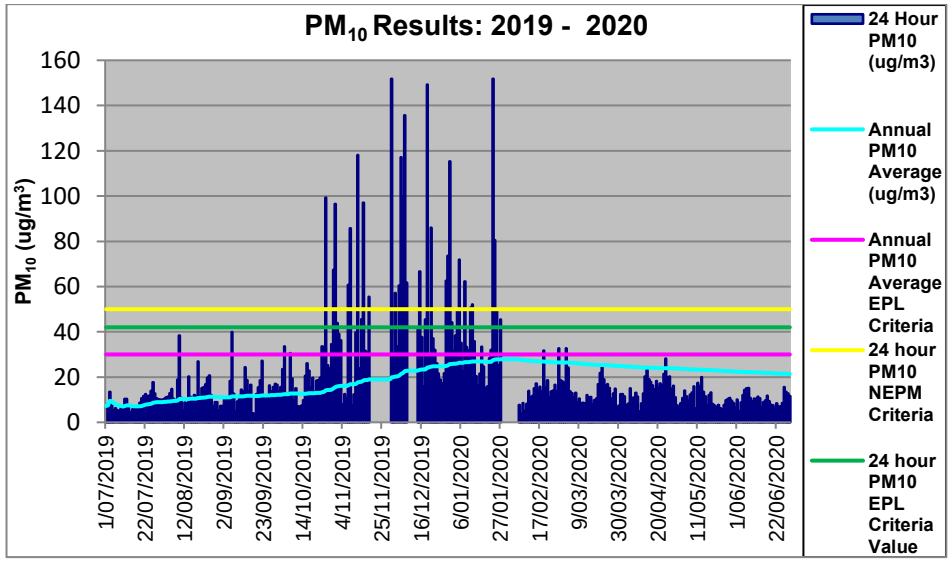


Chart 7: 2019-2020 PM10 Results and Criteria

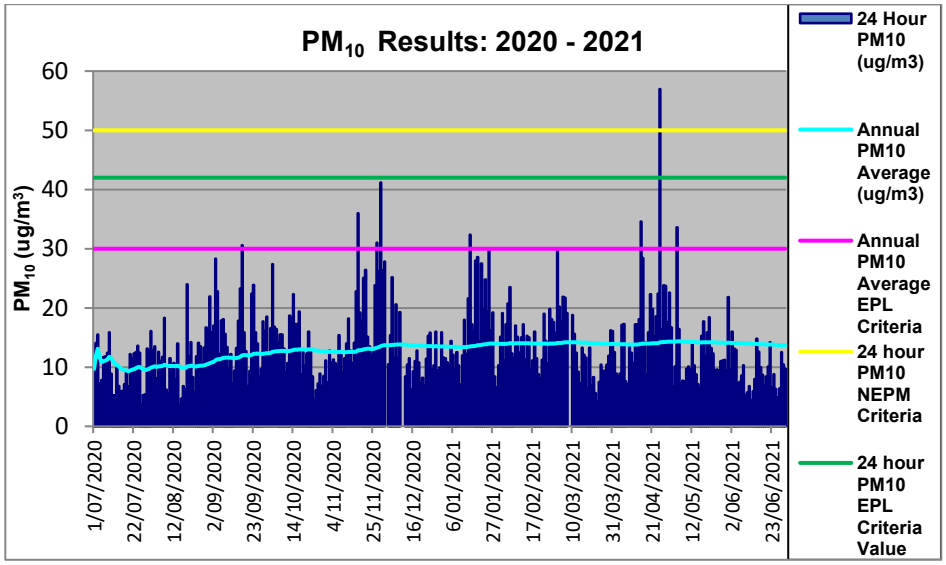


Chart 8: 2020-2021 PM10 Results and Criteria

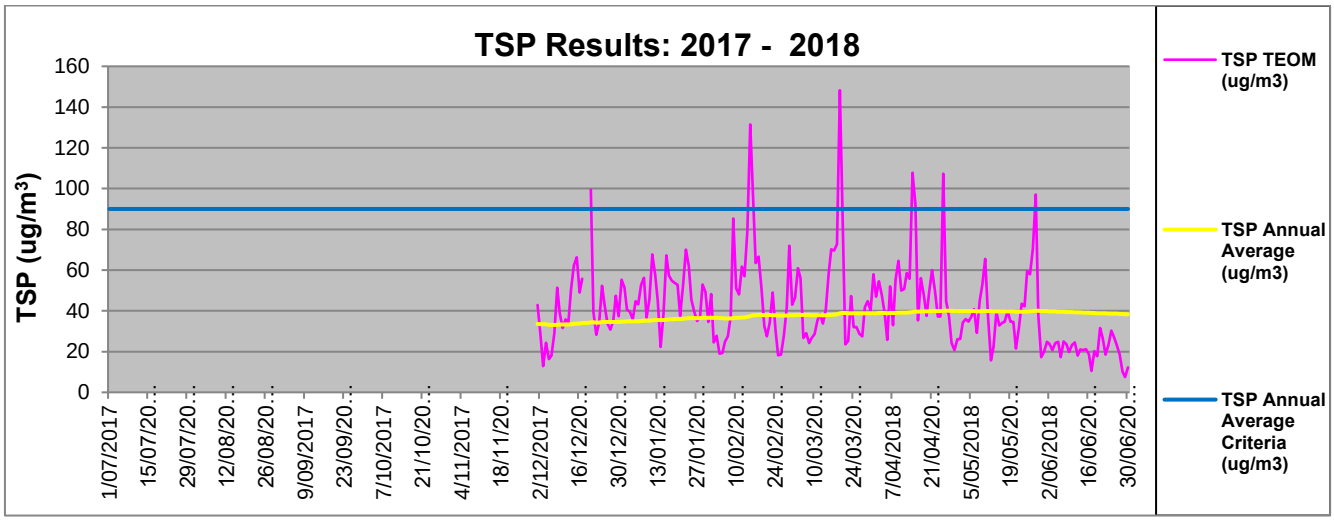


Chart 9: 2017-2018 TSP Results and Criteria

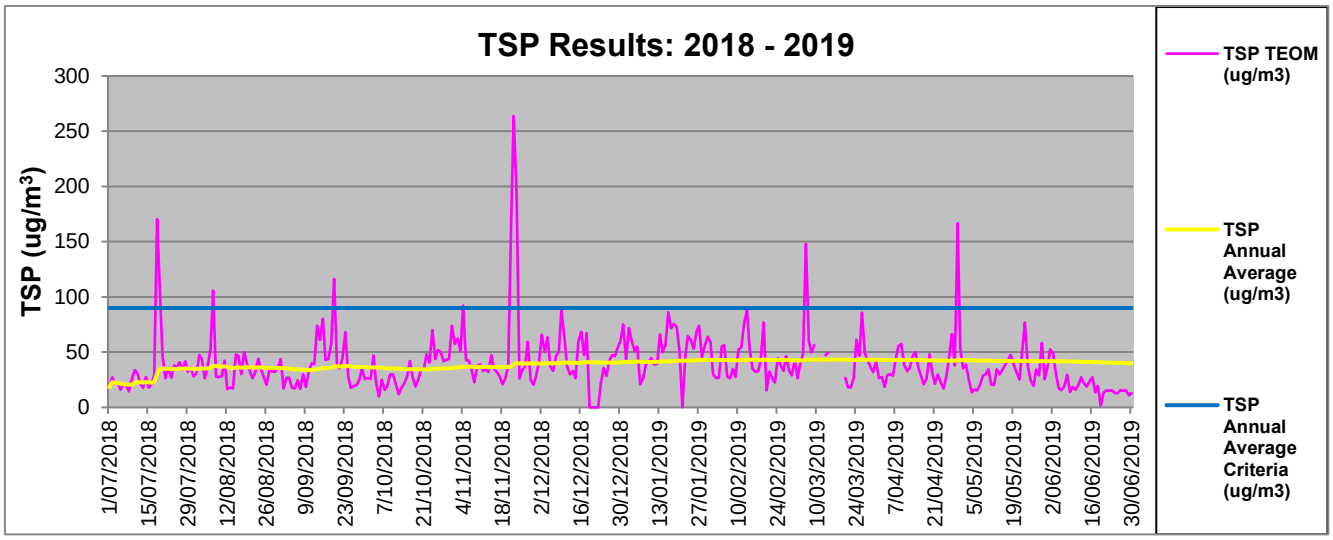


Chart 10: 2018-2019 TSP Results and Criteria

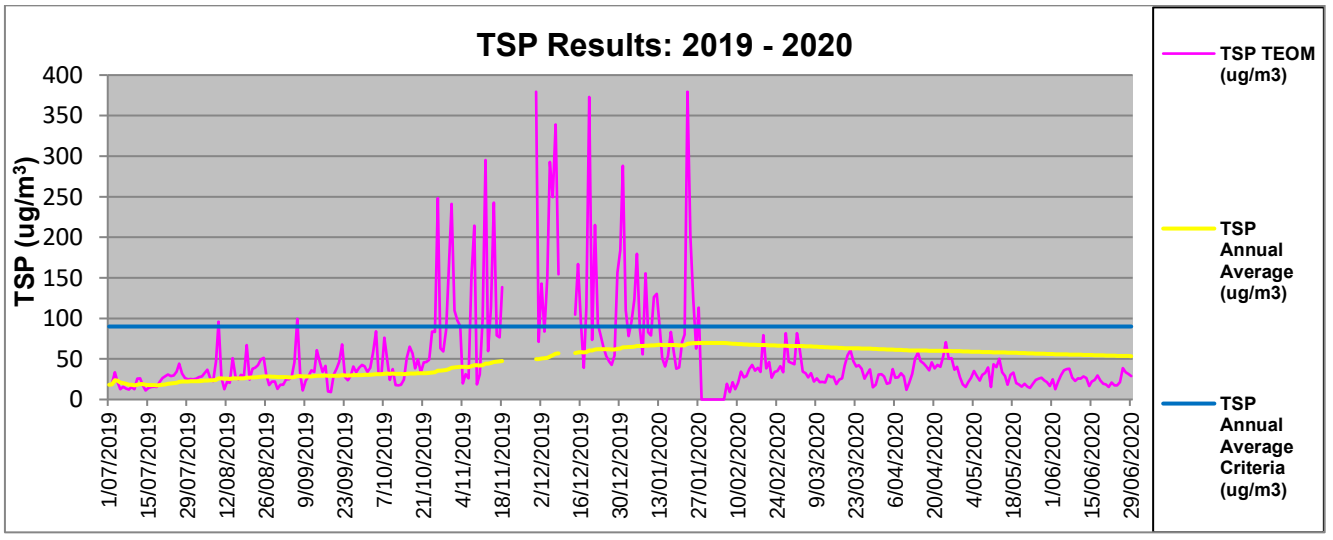


Chart 11: 2019-2020 TSP Results and Criteria

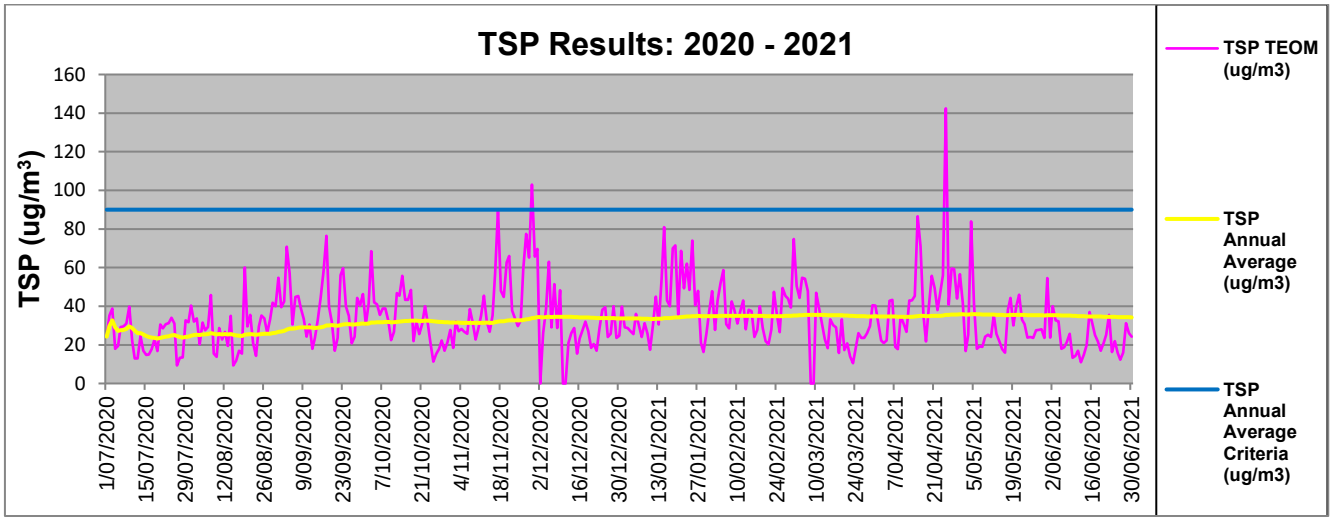


Chart 12: 2020-2021 TSP Results and Criteria

5.1.4 Analysis

Dust Deposition

Reporting Period 2020-2021

Five dust deposition gauges monitor potential dust impacts from the Old Northern Road quarry.

Monthly results and annual dust deposition averages for D01A (Front Gate), D04 (Bund), D05 (Mulloc Heap), D06 (School) and D07 (Bund) for the July 2020 to June 2021 period were in compliant. All annual averages were in compliant with the 4 g/m2/month criteria.

The EIS prepared for the extension of the quarry on Old Northern Road Lots 1 and 2 (ERM, 2001) predicted dust deposition at the nearest receptors to be between 2.2 and 2.9g/m²/month. The majority of the monthly dust deposition results at Old Northern Road quarry for the reporting period were within the EIS predicted range of dust levels, with the exception of the D06 (School) and D01A (Front Gate) which returned slightly higher than predicted monthly results.

Historical Data

It can be seen from Charts 1 to 4 that the majority of the dust deposition results are in compliance over the previous 4 years of monitoring.

D01 (front gate) was relocated in September 2016 (renamed D01(A)). During the 2017-2018, 2018-2019, 2019-2020 and 2020-2021 reporting periods, all monthly and annual average results were generally in compliant.

Annual averages for D04 (Rehab), D05 (Bundwall), D06 (School) and D07 (Mulloc Heap) have been consistently compliant over the last four reporting periods.

PM10

Reporting Period 2020-2021

The EIS predicted a 6th highest PM_{10} 24-hour average of 42 µg/m³ and a PM_{10} annual average of 7 µg/m³ (maximum values for 7 discrete receptors modelled). The air quality statement of evidence presented in the Land and Environment Court of NSW for Lots 1 and 2 (ERM, 2003) predicted that the highest 24-hour PM_{10} ground level concentration would be 37 µg/m³ at receptor 3. Consent DA250-09-01 and the Environment Protection Licence subsequently set a maximum rolling 24-hour average of 42 µg/m³ for the site.

The rolling annual average PM_{10} values (light blue line on Chart 8) remained below the EPA long term criteria of 30µg/m³ (pink line on Chart 8) for this reporting period.

The 24-hour average PM_{10} levels (dark blue columns on Chart 8) remained below the 24-hour EPL management level of 42 µg/m³ (green line on Chart 8) and the 24 hour NEPM short term criteria level of 50 µg/m³ (yellow line on Chart 8), except on two (2) days during this reporting period. Table 12 lists the PM_{10} exceedances, relevant PM10 criteria and explanations.

Table 12: PM10 – EPL and NEPM Management Criteria Exceedances

Event No.	Exceedance Date	Exceeded PM10	Exceeded criteria (ug/m³)	Comment
1	30 Nov 2020	Rolling 24-hour average PM10 values reached 49.1 µg/m3	EPL 3916 Condition M2.4 Rolling 24-hour average PM10 criteria of 42 µg/m3	Self-Reported to EPA on 30/11/2020 (EPA Ref C17677-2020) A Trigger Alarm was received at 1.06 am on 30/11/20 alerting that the rolling 24 hr average PM10 level has reached 42.1 µg/m3 and continuing to rise, peaking at 49.1 µg/m3, The prevailing wind directions were easterly to south-easterly leading up to the time of the alarm. The exceedance was not attributed to quarry operations and therefore quarry operations will continue as normal with regular use of water cart for dust suppression. Note that windy conditions were experienced over the weekend. The DPIE was not notified of this exceedance event as the criteria is stipulated by specific EPL 3916 requirements. During this event, the 50 µg/m3 NEPM 24-hour Average PM10 criteria was not exceeded.
2	25 Apr 2021	Rolling 24-hour average PM10 values reached 53.6 µg/m3 and 24-hour average PM10 value reached 57.0 µg/m3	EPL 3916 Condition M2.4 Rolling 24-hour average PM10 criteria of 42 µg/m3 and 24-hour average PM10 NEPM criteria of 50 µg/m3	Self-Reported to EPA on 26/04/21 (EPA Ref REF-NO-1210) A trigger alarm was received at 07:02 pm on the 25/04/21 alerting that the 24-hr average PM10 level has reached 43.1 µg/m3 which continues to rise and peaked at 53.6 µg/m3 meter between 09:05 and 10:00 pm. The prevailing wind direction leading up to this exceedance were not from the direction of the quarry as specified under condition M2.4. A number of RFS hazard reduction burns were carried out across greater Sydney and the Blue Mountains from the 23/04/21, including the one in the Fiddle Town, Dural, Annangrove, Maroota and Penrith. RFS issued a smoke advisory for the public today. The PM10 exceedance was not attributed to quarry operation as no work are carried out on Sundays. Quarry operations will continue as normal on Monday, 26/04/21, with regular use of water cart for dust suppression. The DPIE was notified of the incident on 26/04/21. A notification and incident report were provided to Maria Divis (Senior Compliance Officer) via email. The following criteria have been exceeded: 1) EPL Rolling 24-hour average PM10 criteria of 42 µg/m3, and 2) 24-hour average PM10 NEPM criteria of 50 µg/m3.

Historical Data

It can be seen from Charts 5 to 8 that all the annual average PM10 results recorded at the TEOM comply with the annual average PM10 criteria of 30μg/m³ over the previous four years of annual review reporting.

A number of 24-hour average PM10 exceedances were recorded over the last four reporting periods with causes attributed to activities not related to quarry operations. Exceedances during the 2017-2018 were attributed to bushfires and scheduled controlled hazard reductions burns in the local and regional areas. Exceedances during the 2018-2019 were attributed to a number of non-quarry related causes including scheduled hazard reduction burns, forecasted gusty winds, storm cells and dust storms passing through Sydney. Exceedances recorded during the 2019-2020 period was highly influenced by cumulative poor air quality associated with bushfires in the local, regional and inter-state areas.

The annual PM_{10} average for the 2020-2021 reporting period was 13.7 μg/m³, which was lower than the EPA criterion of 30μg/m³ but is double of the predicted value of 7 μg/m³ in the EIS. This annual average is comparable to the recorded levels of 16.0 μg/m³ (2018-2019), 15.3 μg/m³ (2017-2018), 12.4μg/m³ (2016-2017) and 11.6 μg/m³ (2015-2016). This year's annual PM_{10} average is significantly lower than the 21.3 μg/m³ recorded during the last 2019-2020 reporting period, which is likely to be due to the return of average rainfall and minimal bushfire events in comparison to the previous two2 reporting periods.

Total Suspended Particles

Reporting Period 2020-2021

The Total Suspended Particles (TSP) results are reported in Charts 9 to 12 inclusive. The annual average TSP for this reporting period is 34.3 μg/m³ which is lower than the annual average TSP criteria of 90 μg/m³ set out by the consent and EPL. The elevated TSP values were a reflection of high PM10 values.

Historical Data

Reporting of TSP commenced in December 2017. Historical annual average TSP values were 38.3 μg/m³ (2017-2018), 40.0 μg/m³ (2018-2019) and 53.4 μg/m³ (2019-2020). The higher annual average TSP value recorded in 2019-2020 were attributed to cumulative effects of poor air quality associated with bushfires in the local, regional and inter-state areas.

5.1.5 Changes to Environmental Procedures

No changes to the environmental procedures are proposed or deemed necessary for air quality management.

In the event of significant amount of visible dust being observed at the premise, follow the steps outlined in the Air Quality Management Plan.

5.2 Noise Management

5.2.1 Noise Sources and Mitigation Measures

The objectives, criteria limits, procedures, response, reporting and responsibilities of noise management are contained in the Noise Management Plan.

The following potential sources of noise and mitigation measures at the Old Northern Road have been identified in Table 13.

Table 13: Potential sources of Noise and mitigation measures.

Potential Noise Sources	Mitigation Measures
• Extraction by bulldozers and excavators; • Moving of materials and stockpiling by dump trucks and excavators; • Truck haulage including bogie trucks, truck and dogs; • Wet/dry processing of sand; and • Ancillary activities including maintenance undertaken in the workshop • Construction/ maintenance of bund walls	• Construction of noise bunds in strategic locations as stipulated in the EIS/EAs and consent conditions; • Compliance with approved hours of operation; • Regular maintenance of road surfaces, vehicles and equipment to reduce noise emissions; and • Enforcement of speed limits for trucks and limited use of exhaust brakes in residential and school areas. • Enforcement of a 20km/h speed limit on quarry access road and haul roads. • Switch off plant when not in use and use of automatic idle shutdown.

The Noise Management Plan for Old Northern Road quarry requires attended noise monitoring to be undertaken bi-annually.

5.2.2 Compliance Limits

Noise Criteria

The Old Northern Road noise criteria are listed in Table 14. The approved hours of operation are contained in Table 15. Noise monitoring for the quarry is based on these criteria.

Table 14: Old Northern Road Noise Criteria.

<table>
<tr><th>Consent Condition</th><th>Conditions</th></tr>
<tr><td>DA250-09-01, Condition 3 of Schedule 3 and</td><td>The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.

Table 2: Noise criteria dB(A)
<table>
<tr><th>Receiver</th><th>Averaging Period</th><th>Shoulder (6.00 am to 7.00 am)</th><th>Day (7.00 am to 6.00 pm)</th></tr>
<tr><td>Any residence on privately owned land</td><td>$L_{Aeq\ (15\ minute)}$</td><td>37</td><td>44</td></tr>
<tr><td>Any classroom at Maroota Public School</td><td>$L_{Aeq\ (1\ hour)}$</td><td>-</td><td>45</td></tr>
</table>
</td></tr>
</table>

	Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria. However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement. *Note: Should an agreement with a landowner be terminated for any reason, the Applicant must comply with the noise criteria in Table 2.*

Table 15: Old Northern Road Approved Hours of Operation.

<table>
<tr><th>Consent Condition</th><th>Condition</th></tr>
<tr><td>DA250-09-01, Condition 1 of Schedule 3</td><td>The Applicant must comply with the operating hours set out in Table 1.
Table 1: Operating hours
<table>
<tr><th>Activity</th><th>Permissible Hours</th></tr>
<tr><td rowspan="2">Quarrying operations (excluding truck arrival, loading and dispatch)</td><td>7.00 am to 6.00 pm Monday to Saturday</td></tr>
<tr><td>At no time on Sundays or public holidays</td></tr>
<tr><td rowspan="2">Truck arrival (unladen)</td><td>5.45 am to 6.00 pm Monday to Saturday</td></tr>
<tr><td>At no time on Sundays or public holidays</td></tr>
<tr><td rowspan="2">Truck loading
Truck dispatch
Truck arrival (laden)</td><td>6.00 am to 6.00 pm Monday to Saturday</td></tr>
<tr><td>At no time on Sundays or public holidays</td></tr>
<tr><td>Bund construction or rehabilitation works within 250 m of Maroota Public School</td><td>7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA</td></tr>
<tr><td>Maintenance</td><td>May be conducted at any time, provided that these activities are not audible at any privately-owned residence</td></tr>
</table></td></tr>
<tr><td>DA250-09-01, Condition 2 of Schedule 3</td><td>The following activities may be carried out outside the hours specified in condition 1 above:
(a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and
(b) emergency work to avoid the loss of lives, property or to prevent environmental harm.
In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.</td></tr>
</table>

5.2.3 Results

Attended noise monitoring was undertaken in December 2020 and June 2021. Attended noise monitoring was conducted at receivers (where permission to enter the property was granted) and at-source, in accordance with the requirements of the Noise Management Plan. In instances where extraneous noise such as road traffic and insects were found to be the dominant noise sources, noise levels were obtained at alternative locations closer to the quarry. Predicted noise levels are then extrapolated from the near-distance location to the sensitive receiver locations.

Quarry operations fell into four categories for main sources of noise which were:

- sand processing and truck loading (main plant, front end loaders, trucks),
- extraction of sand (involving ripping by dozer, screening, stockpiling with front end loader, moxie and dozer),
- extraction of bulk sandstone by rock saw, and

- dewatering activities with dewatering pumps.

Results for predicted noise impacts for Old Northern Road quarry undertaken in December 2020 and June 2021 are contained in Tables 16 and 17 respectively.

The full noise monitoring reports for December 2020 and June 2021 are contained in Appendix D.

Table 16: Extrapolated noise levels for Old Northern Road Quarry, December 2020.

Receiver	Noise Criteria (dBA)		Extrapolated noise level (dBA)	Comment
	Shoulder	Day		
OR1	-	45	44	Predicted levels correlate well with measured levels and all locations shown to comply with noise limits during the day period.
OR2	37	44	44	
OR3			39	
R2			43	
R3			44	
R4/R5			44	

*Note: A noise agreement between Dixon Sand and residents of receiver R1 and OR2 is in place and therefore the noise criteria do not apply.

Table 17: Predicted Noise Impacts for Old Northern Road Quarry, June 2021.

Receiver	Noise Criteria (dBA)		Extrapolated noise level (dBA)		Comment
	Shoulder	Day	(Ripping hard rock - scenario 1)	(Alternative dozer - scenario 2)	
OR1	-	45	46	42	**Scenario 1** Predicted levels correlates well with measured levels and most locations shown to slightly exceed noise limits during day period. **Scenario 2** Predicted levels correlate well with measured levels and all locations shown to comply with noise limits during the day period.
OR2	37	44	45	44	
OR3			46	43	
R2			43	42	
R3			42	41	
R4/R5			45	44	

*Note: A noise agreement between Dixon Sand and residents of receiver R1 and OR2 is in place and therefore the noise criteria do not apply.

5.2.4 Analysis

Old Northern Road - Attended Noise Monitoring – December 2020

Noise monitoring and modelling results indicated that the Quarry was compliant with the criteria for shoulder period and daytime operations when all equipment were in operation.

Old Northern Road - Attended Noise Monitoring – June 2021

Noise monitoring and modelling results during the operation of Scenario 1 – dozer ripping hard rock indicated that the observed operations during the shoulder period and daytime were slightly above but compliant with the noise limit at each receiver under the meteorological conditions at the time. Additional noise monitoring and modelling results during the typical operation of Scenario 2 – dozer working closer to the pit wall in softer material demonstrated compliance with the noise limits and is reflective of previous monitoring surveys.

5.2.5 Noise Exceedance and Non-Compliance

Old Northern Road - Attended Noise Monitoring – June 2021

Modelled noise from attended noise monitoring undertaken on 18th June 2021 identified noise exceedances at a number of receivers. Dixon Sand received the Noise Report on 25th June 2021 and subsequently, an incident notification was provided to the DPIE and EPA on 28th June 2021.

Description, Date and Time of Incident:

The noise exceedances were recorded on Friday 18th June 2021 at the following times and locations:

- 10:27 am at Receiver OR1 (Maroota Public School),
- 11:35 am at Receivers 4&5 (4547 – 4543 Old Northern Road, Maroota), and
- 10:27am at Receiver OR3 (4634 Old Northern Road, Maroota)

Details of Noise Exceedance:

The daytime period noise criteria contained in Table 2 of Condition 3, Schedule 3, DA250-09-01 were exceeded at Receivers OR1, OR3 and 4/5 with the following exceeded noise level derived from noise modelling:

- Receiver OR1 (Maroota Public School) – exceedance of 1 dB(A)
- Receivers 4/5 (4547 – 4543 Old Northern Road, Maroota) – exceedance of 1 dB(A)
- Receiver OR3 (4634 Old Northern Road, Maroota) – exceedance of 2 dB(A)

A noise agreement is in place between Dixon Sand and the Acurso family who reside at 4590 and 4624 Old Northern Road (receivers R1 and OR2 respectively). Therefore, the noise criteria outlined in Condition 3 of Schedule 3 of DA250-09-01 do not apply at these residents.

Actions taken to prevent re-occurrence:

The Quarry undertook additional noise monitoring on 22nd June 2021 and modelling for the 'business as normal' procedure where the dozer was relocated to the location of softer materials near the quarry face. Scenario 2 of Table 17 presents the modelled noise monitoring results for the alternative 'business as usual' quarry operations.

Extrapolated results of the 'business as usual' scenario indicated lower levels of noise being generated by the operation which would be compliant with the noise criteria. Under this circumstance, the extraction pit wall acted as additional noise barrier and noise generated by the dozer would be quieter. Therefore, to prevent any re-occurrence of the noise exceedance during this incident, the scenario of ripping hard rock will not be repeated for the foreseeable future.

Identification of Non-Compliance against Development Consent:

In accordance with Section 11.1.3 of the NSW Industrial Noise Policy (EPA, 2000), a development will be deemed to be in non-compliance with a noise consent or license condition if the monitored noise level is more than 2 dB above the statutory noise limit. The noise exceedances resulted from the noise modelling did not exceed the noise criteria by more than 2 dB. Therefore, noise exceedances during this incident are not deemed as a non-compliance.

5.2.6 Discrepancies between Predicted and Actual Noise Impacts

Table 18 compares the predicted noise levels contained in the EIS (ERM, 2001) during non-adverse weather with quarry operations in Strip 2 and 3 on Lots 1 and 2. The extrapolated noise levels from December 2020 and June 2021 assessment at the receivers are also presented here for comparison.

Modelled noise impacts contained in the EIS (ERM, 2001) show that a maximum external level of LAeq 36 dB(A) has been calculated for the Maroota Public School (the school) and assuming that internal noise levels are 10 dB less than external noise levels (with windows opened), the predicted internal noise level is approximately 26 dB(A).

Extrapolated December 2020, June 2021 (Scenario 1) and June 2021 (Scenario 2) noise monitoring results at the school (external) yield noise levels of 45 dB(A), 46 dB(A) and 42 dB(A) respectively. Extrapolated noise monitoring results for residences on Old Northern Road yielded levels between 39 and 46 dB(A).

There are minor discrepancies between the predicted and actual noise impacts experienced at the school and residences with elevated noise levels modelled for June 2021 (Scenario 1). All noise impacts comply with the daytime noise criteria. Dixon Sand is currently operating and extracting materials in Strip 3 which is east of Strip 2 which was the location used to model predicted impacts in the EIS (ERM, 2001). Therefore, current quarry operations are located closer to the school and receivers, which resulted in the recorded noise levels being higher than the predicted levels.

Table 18: Comparison of predicted and actual noise impacts, December 2020 and June 2021.

Receptor	EIS (ERM, 2001) Predicted Daytime Noise Levels LAeq (dB(A))	Daytime Noise Criteria LAeq (dB(A))	December 2020 Daytime Noise Levels	June 2021 Daytime Noise Levels (Scenario 1 - Ripping hard rock)	June 2021 Daytime Noise Levels (Scenario 2 - Alternative dozer)	Compliance with Daytime Noise Criteria
R1	43	**44**	N/M	N/M	N/M	Yes
R2	40	**44**	43	43	42	Yes
R3	37	**44**	44	42	41	Yes
R4	35	**44**	44	45	44	Yes
R5	34	**44**	44	45	44	Yes
R6 (OR3)	N/A	**44**	39	46	43	Yes
School Building 1 (OR1)	36 (external) ~26 (internal)	**45**	44	46	42	Yes
School Building 2	35 (external) ~25 (internal)					

Note: N/A – R6 residential building constructed after the EIS (ERM, 2001)

N/M – R1 noise levels not measured due to existing Noise Agreement between Acurso and Dixon Sand.

5.2.7 Noise Trend

As quarry operations progress eastwards on Lots 1 and 2 towards Maroota Public School and other identified private residences, noise levels are expected to increase as a result of reduced proximity between machinery and noise receivers.

Charts 13 to 18 illustrate the long-term trend in noise monitoring levels for Maroota Public School and residences on Old Northern Road. Noise monitoring were undertaken during the period 2003 to 2007 however data has been omitted from this trending analysis due to the monitoring locations differing from the locations identified in the current Noise Management Plan.

It can be seen from Chart 13 that quarry noise level fluctuations occurred at Maroota Public School over the eleven-year period, with a general increasing trend with daytime noise level peaking in December 2019 at LAeq15 45 dB(A) and June 2021 at LAeq15 46 dB(A).

Chart 14 provides long-term data for receiver OR2 at 4624 Old Northern Road. Fluctuations in daytime and shoulder noise levels can be observed where reduced daytime noise levels were recorded between December 2011 to May

2014, possibly a consequence of reduced quarry activities on Lots 29 and 196. From December 2014 to date, a general increasing daytime noise levels trend can be observed, with noise levels ranging from LAeq15min 34.1 to 45 dB(A).

Charts 16 and 17 display an increasing trend in quarry noise levels at receivers R2 and R3 from December 2018 to date, peaking at LAeq15 44 dB(A).

Chart 15 shows long term trend at receiver OR3 (R6) ranging between LAeq15 37 and 46 dB(A).

Chart 18 shows long term trend at receiver R4/5 with an increasing trend in noise levels from December 2018, peaking at LAeq15 45 dB(A).

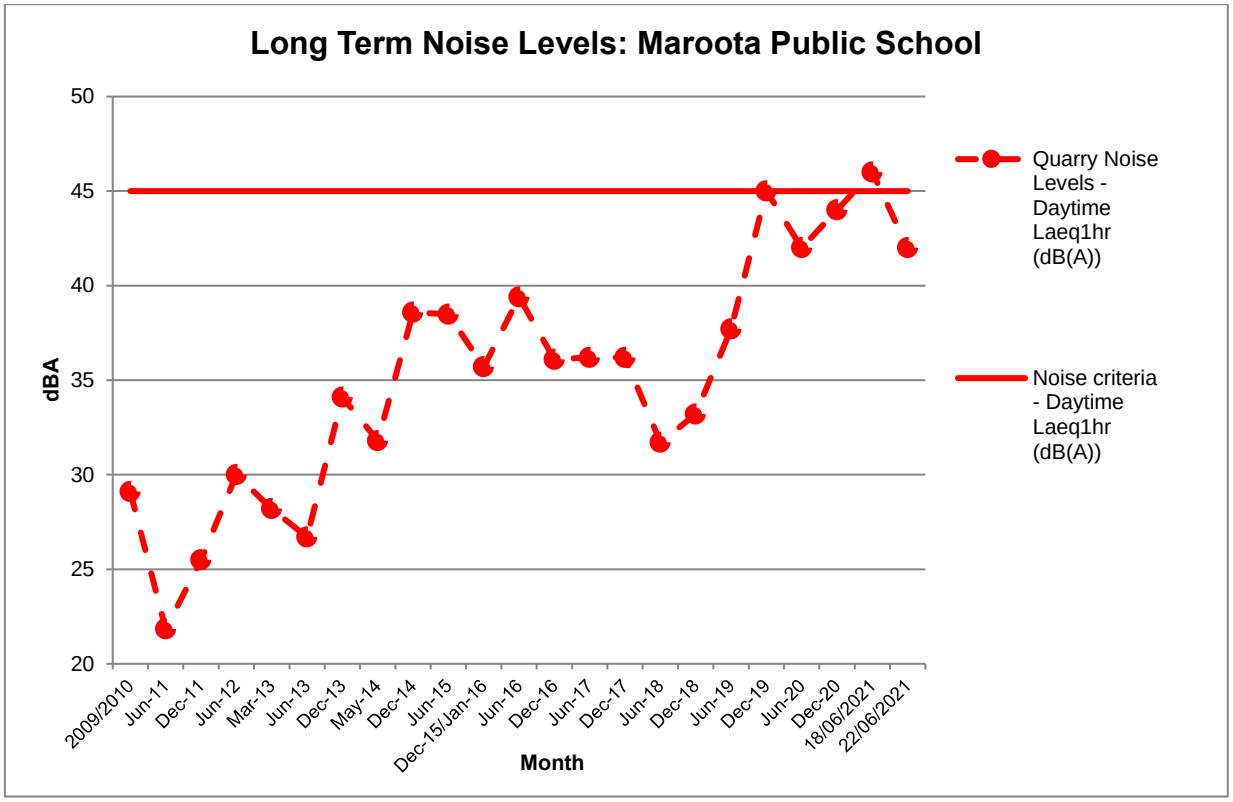


Chart 13: Long term noise trend – Maroota Public School

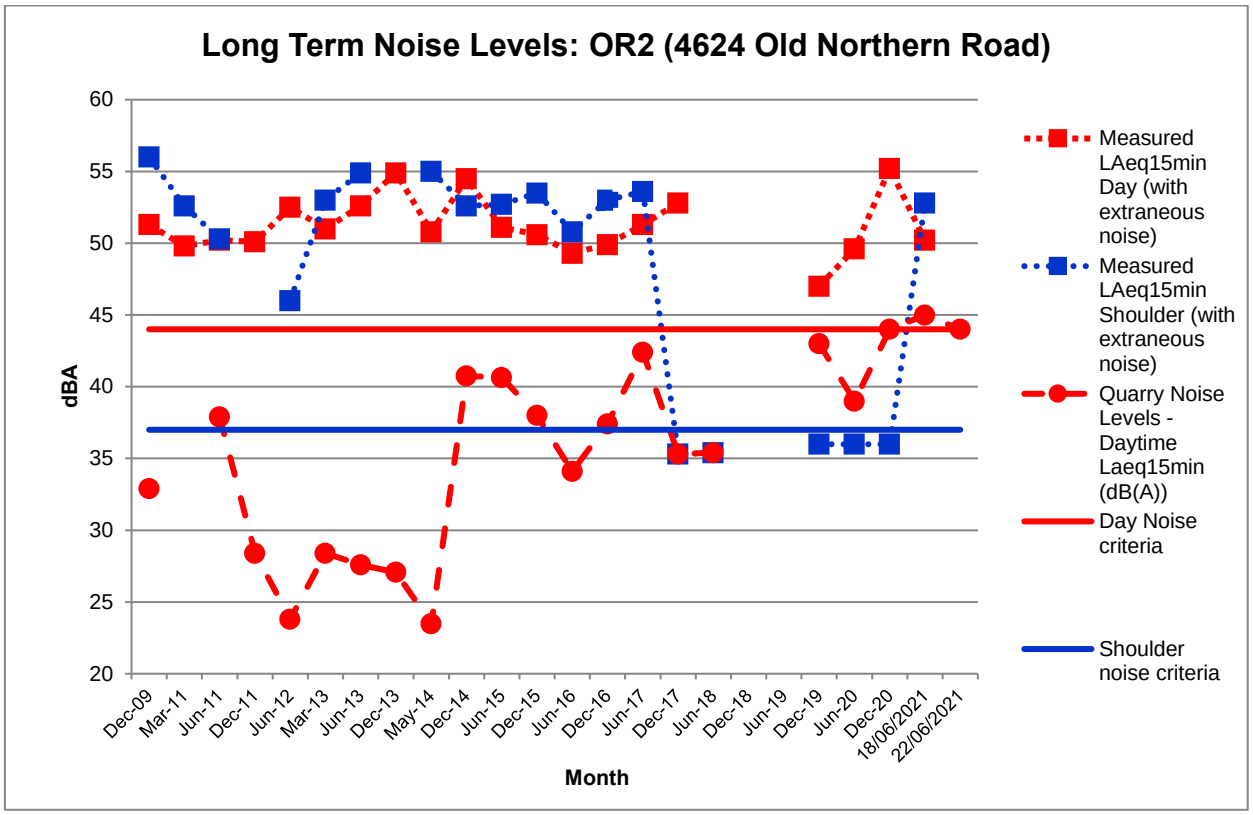


Chart 14: Long term noise trend – OR2 (No. 4624 Old Northern Road)

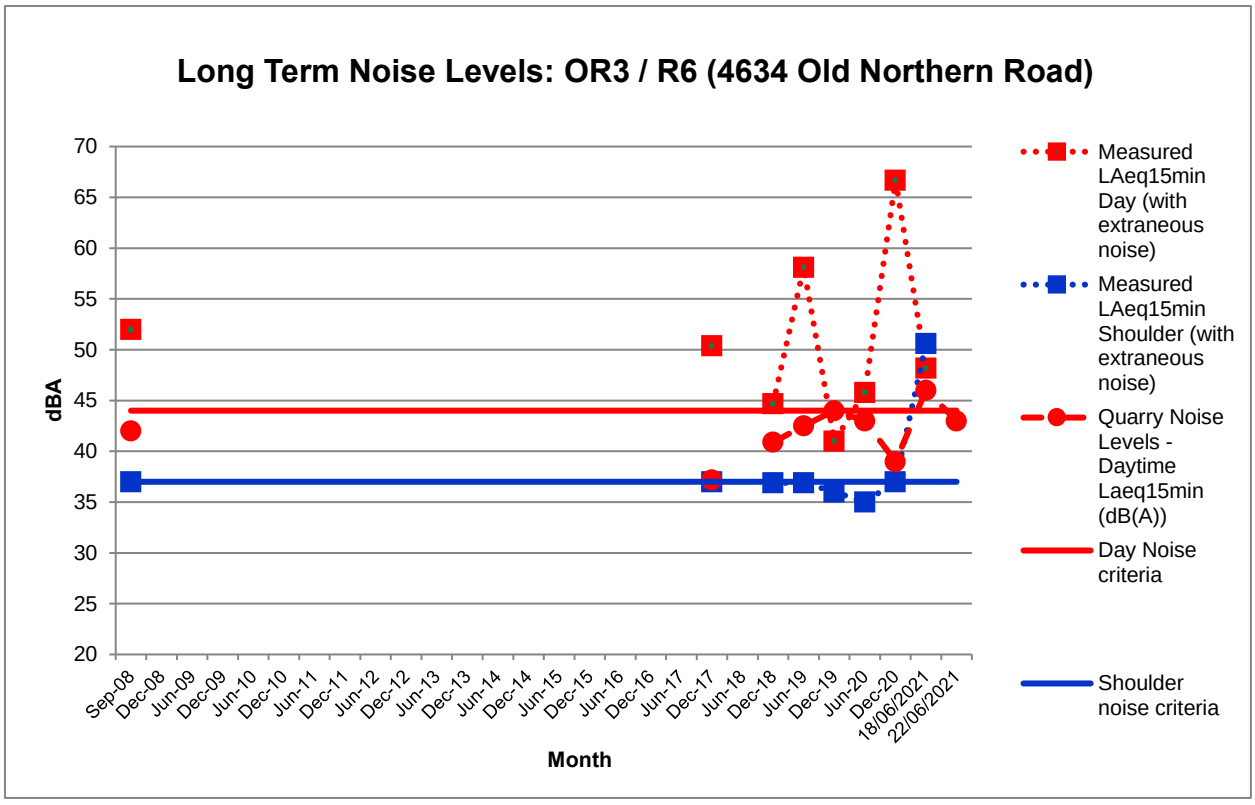


Chart 15: Long term noise trend – OR3/R6 (No. 4634 Old Northern Road)

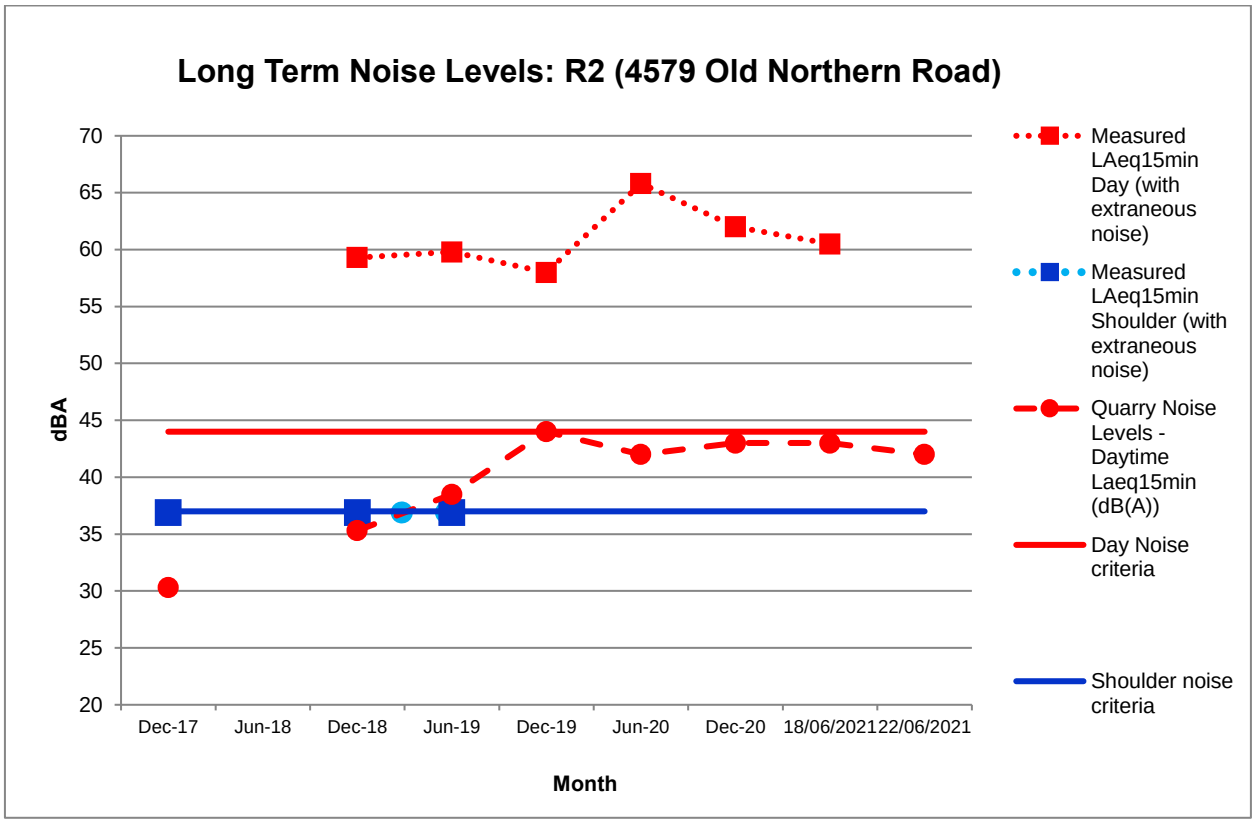


Chart 16: Long term noise trend – R2 (No. 4579 Old Northern Road)

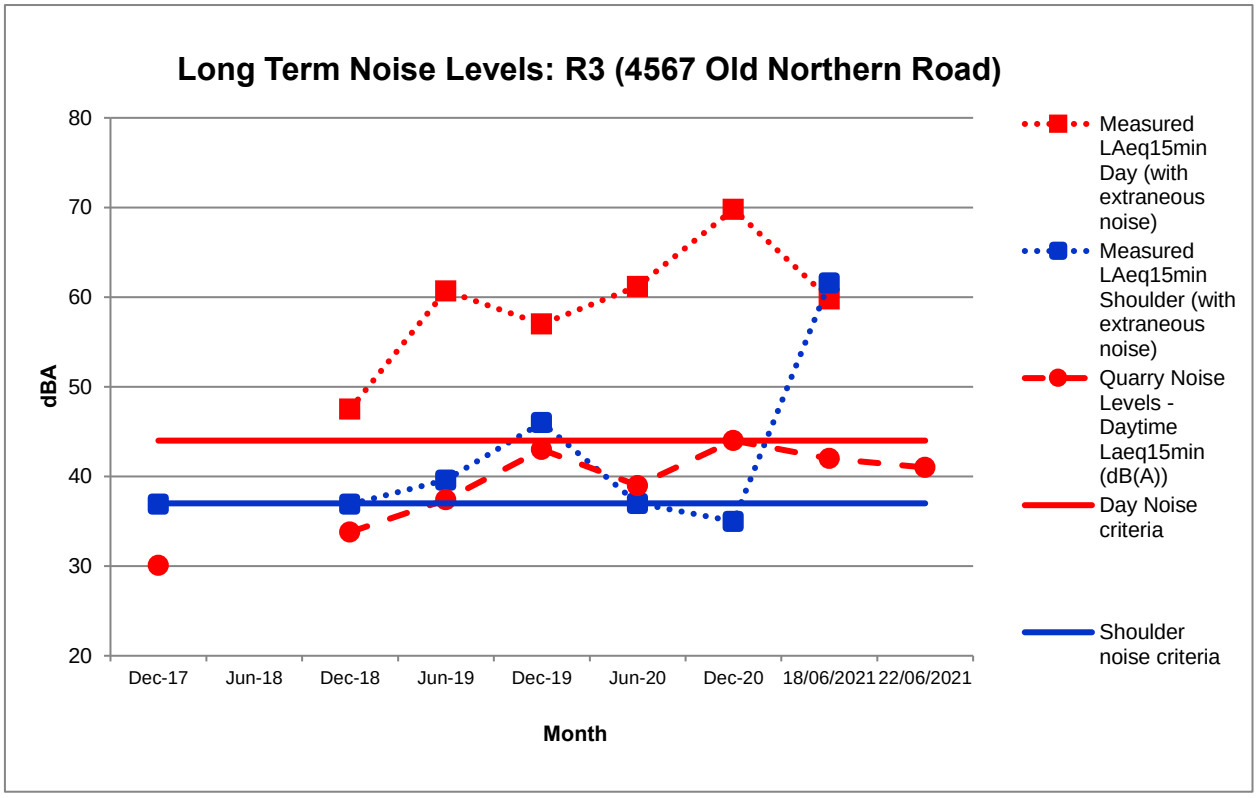


Chart 17: Long term noise trend – R3 (No. 4567 Old Northern Road)

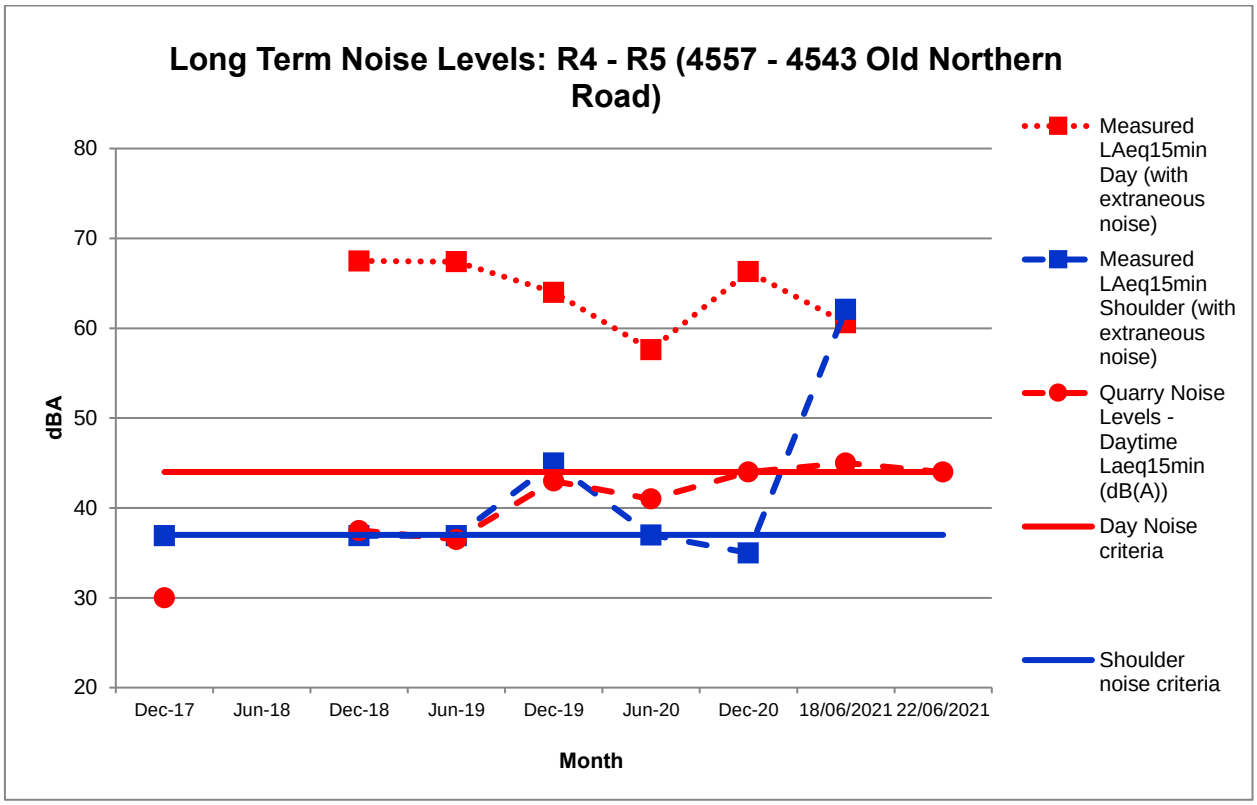


Chart 18: Long term noise trend – R4/R5 (No. 4634 Old Northern Road)

5.2.8 Changes to Environmental Procedures

Minor change is proposed to the noise management strategy at Old Northern Road quarry. The cause of the minor noise exceedance recorded during the June 2021 attended monitoring was rectified immediately. Extrapolated results of the 'business as usual' scenario indicated lower levels of noise being generated by the operation which would ensure compliance with the noise criteria. Under this circumstance, the extraction pit wall acted as additional noise barrier and noise generated by the dozer would be quieter. Therefore, to prevent any re-occurrence of the noise exceedance during this incident, the scenario of ripping hard rock will not be repeated for the foreseeable future.

Dixon Sand is required to construct a noise bund within the 250m buffer to the Maroota Public School prior to commencing extraction in Strip 4 on Lots 1 and 2. Any construction or maintenance of noise bund walls are to be carried out in accordance with the strategies outlined in the Old Northern Road Noise Management Plan. Should vegetation clearing be required for the bund construction, undertake vegetation clearing in accordance with the pre-clearing procedures.

Continue to undertake attended noise monitoring in accordance with the Noise Management Plan.

5.3 Traffic and Transport

5.3.1 Ongoing Management Measures

Vehicle Movements

Vehicle movement records have been sent to Council on a monthly basis and Section 94 Contribution payments made. There were no exceedances of permitted vehicle movements during the reporting period.

Monthly Inspections

Observations of road conditions and maintenance requirements are inclusive in the monthly site inspection checklists. An example of the monthly site inspection checklist is attached in Appendix E.

Community Liaison

Liaison between Dixon Sand and the representative of Maroota Public School is conducted on a regular basis during the Community Consultative Committee meetings which are held bi-annually. Details of the CCC meetings and community engagement and contributions are discussed further in Section 8.

5.3.2 Traffic Related Complaints

One traffic related complaint was received for Old Northern Road Quarry during the 2020-2021 reporting period. The details of the complaint, recommendations and outcome are summarised in Table 19 below. The complaint has been closed out.

Please note that Dixon Sand has no jurisdiction over haulage trucks outside the quarry premise as these are not contracted or owned by Dixon Sand. The enforcement of truck noise compliance rests with RMS and the EPA. Dixon Sand does not operate its own truck fleet and is restricted by its legal jurisdiction in prohibiting the use of the trucks' safety features. Dixon Sand however is committed to assisting in the education campaign through induction, traffic management policies and inter-pit agreement.

A copy of the complaints register containing the complaints received during the reporting period is attached in Appendix K.

Table 19: Traffic Complaints, recommended action(s) and outcome

Old Northern Road Quarry **Complaint No. 1**	
Date complaint received	2 September 2020 Complaint received by Weighbridge Operator via email.
Issue	The Complainant advised that they have witnessed a tipper truck driving in a dangerous manner and excessively over the speed limit. The Complainant had witnessed a truck driving up to 107 km/h on the Cattai Reserve straight on Wisemans Ferry Road. The Complainant had passed on the truck registration number to Windsor Police. The Complainant noted that the issue has been brought up and discussed in the local Maroota social media page.
Recommended Action(s)	• Notify the Quarry Manager and/or Environmental Officer immediately • Request a copy of truck registration to check against Dixon Sand's customer haulage truck register and liaise with PF Formation and Hodgson Quarries in accordance with the Maroota Local Traffic Management Policy.

	• If the truck in question is confirmed to have picked up products from one of the three quarries, check if the truck has a previous offence(s) and notify the truck company as a formal warning. • Quarry Manager to execute appropriate disciplinary action. • If the truck in question has been verified to have picked up products from one of the three quarries, notify other truck drivers at the quarry of the nature of complaint / non-compliance and remediation action (privacy and identity of complainant and truck driver must be maintained).
Outcome	• 02/09/2020 (6:32 am) – Weighbridge Operator contacted the Complainant requesting a copy of the truck registration number in order to proceed with internal investigation. • 03/09/2020 (9:16 am) – Complainant provided a copy of the truck registration number. • 03/09/2020 (10:04 am) – Weighbridge Operator confirmed with the Complainant that the truck in question does not match any truck on Dixon Sand's truck register. A copy of the Complainant's email has been forwarded to David Dixon (Quarry Manager / Director) who has contacted both PF Formation and Hodgson quarries and requested they check their truck registers. The Complainant was advised that they will be contacted once confirmation from the other two quarries are provided. • 03/09/2020 (7:25 pm) – Complainant replied and further expressed their concerns for the safety of road users. • 04/09/2020 (10:44 am) – Weighbridge Operator informed the Complainant that the Quarry Manager received confirmation from both PF Formation and Hodgson Quarries that the truck in question is not associated with their quarries. Tom Watson reassured the Complainant that had the truck have an association with any of the three quarries then appropriate action would be taken.
Close out Date	4 September 2020

5.3.3 Compliance

Assessment of compliance against the relevant conditions is summarised in Table 20.

Table 20: Road and Traffic Compliance.

DA250-09-01 (Mod 5)	Condition	Compliance	Comments
Condition 5(b) of Schedule 2	continue to receive and process extractive material from Haerses Road Sand Quarry, and dispatch quarry products from the site, until 14 February 2046.	Yes	Material transported from Haerses Road to Old Northern Road during this reporting period.
Condition 7 of Schedule 2	Truck movements at the site (i.e. one-way trip, either arrival or dispatch), including truck movements between the site and the Haerses Road Sand Quarry, must not exceed: (a) 180 per day; and (b) 40 between 5.45 am and 7.00 am.	Yes	Maximum recorded daily truck movements were **180 in and out bound.** Maximum number of morning trucks was **20 inbound**
Condition 12 of Schedule 2	The Applicant must pay Council an annual financial contribution toward the maintenance of local roads used for haulage of quarry products. The contribution must be determined in accordance with The Hills Shire Council Contributions Plan No. 6 Extractive Industries, or any subsequent relevant contributions plan adopted by Council.	Yes	Refer to Appendix I for S.94 contribution
Condition 1 of Schedule 3	The Applicant must comply with the operating hours set out in Table 1.	Yes	Refer to truck records

DA250-09-01 (Mod 5)	Condition	Compliance	Comments

Table 1: Operating hours

Activity	Permissible Hours
Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday
	At no time on Sundays or public holidays
Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday
	At no time on Sundays or public holidays
Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday
	At no time on Sundays or public holidays
Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

Condition 2 of Schedule 3	The following activities may be carried out outside the hours specified in condition 1 above: (a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.	Yes	Condition not triggered
Condition 21 of Schedule 3	The Applicant must keep accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publish a summary of records on its website every 6 months.	Yes	Refer to Summary Truck Record on Dixon Sand's website: http://www.dixonsand.com.au/environment
Condition 22 of Schedule 3	The Applicant must: (a) advise its drivers and its clients not to arrive at the site prior to 5:45 am on any day; (b) ensure that all laden trucks have their loads covered when arriving at or leaving the site; (c) ensure that all laden trucks are cleaned of material that may fall from vehicles, before leaving the site; and (d) use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport product from the development so they can be easily identified by road users.	Yes	Requirements outlined in the Traffic Management Plan

DA250-09-01 (Mod 5)	Condition	Compliance	Comments
Condition 2 of Schedule 3	The Applicant must prepare a Traffic Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be prepared in consultation with the RMS and Council; (b) be submitted to the Secretary for approval within 3 months of the approval of Modification 5, unless otherwise agreed by the Secretary; (c) describe the processes in place to control the arrival and dispatch of trucks; (d) include a Drivers' Code of Conduct that details the safe and quiet driving practices that must be used by drivers travelling to and from the site, particularly in the vicinity of the Maroota Public School; (e) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct; (f) include specific measures to minimise the impact of heavy vehicles, including restrictions on routes and times (particularly in relation to peak hours, holiday periods and times immediately before and after school hours, i.e. 8.30 am – 9.00 am and 3.00 pm – 3.30 pm); and (g) propose measures to minimise the transmission of dust and tracking of material onto the surface of the public road from vehicles leaving the quarry. The Applicant must implement the approved Traffic Management Plan as approved by the Secretary.	Yes	Refer to the Traffic Management Plan

5.3.4 Analysis

The production and truck movement data outlined above is evidence that Dixon Sand has operated in compliance with the consent conditions during the 2020-2021 reporting period.

One traffic related complaint was received for Old Northern Road Quarry. The complaint was related to a haulage truck speeding and driving in a dangerous manner on Wisemans Ferry Road. The complaint related to actions which occurred outside the quarry premise. The complaint was investigated, resolved and closed out. In this instance, the haulage truck in question was not associated with Dixon Sand, PF Formation and Hodgson Quarries, whom are signatories of the Maroota Local Traffic Management Policy.

It should be noted that Dixon Sand has no jurisdiction over the trucks once they have left Dixon Sand's premises. A review of the truck record indicates all trucks are operating in accordance with the consented hours of operation. No further actions are required.

5.3.5 Findings and Effectiveness of Traffic Management

Current traffic management and mitigation measures are being implemented through Old Northern Road Quarry Traffic Management Plan (TMP). The mitigation measures listed in Table 5.1 in the TMP are categorised into three main categories: (1) truck movement measures, (2) site operational control measures and (3) transport related consultation measures.

During the period of this Annual Review, the adopted mitigation measures have been effective in managing traffic on the quarry premise. Restrictions on number of truck movements to and from site during morning and daytime period have been complied with. All haulage truck operators have been inducted onto site and a record maintained.

During induction, the haulage truck operators were provided with a copy of the following documents:

- Site Traffic Management Plan - outlining specific requirements the responsibilities and requirements,
- Quarry Premise Map - showing traffic flow directions,
- Maroota Local Traffic Management Policy - outlining the inter-pit agreement between the three signatories of local quarries, and
- Site Induction Declaration – declaration to be made and signed by haulage truck operators confirming induction requirements.

The implemented mitigation measures and educational campaign increases awareness and emphasises the importance of traffic related compliance. This has proven to be effective as there is a decreasing trend in the number of traffic related complaints over the last three reporting years, as discussed in later Section 8.3.

5.3.6 Additional Management Controls

The Maroota Local Traffic Management Policy (MLTMP) was reviewed, updated and signed by the local quarry signatories on 17 January 2020. This MLTMP (2020) supersedes the original MLTMP.

Additional traffic management controls were proposed in the previous Annual Review period as a result of the review and revision of the TMP. A compliance procedure is an additional management control that has been added to the TMP and induction documents. The inclusion of a compliance procedure in the induction documents provides reiteration to haulage truck operators of the expected outcome should the requirements contained in the TMP are not complied with.

Dixon Sand continues to show its support towards the CCC's recommendation to extend the school zone time outside Maroota Public School in the afternoon from 16:00 to 16:30 due to safety concerns for students waiting for school bus pickup within that period. The matter has been raised by the CCC Chairperson with the member of the Hawkesbury Electorate and future correspondences will be dealt with in the CCC meetings. The outcome of this proposal has yet to be resolved.

5.3.7 Changes to Environmental Procedures

No changes to the environmental procedures are proposed or deemed necessary for road and traffic management.

5.4 Waste Management

5.4.1 Waste Generation, Disposal and Recycling

During the reporting period, waste oil and grease were removed from the quarry by a licensed contractor for processing and disposal. Scrap metals were transported by a licensed waste transporter and recycled at a licensed metal recycling facility.

Glass, paper, cardboard and plastic (general solid waste – non-putrescible) were recycled via Council's fortnightly scheduled bin collection service. Food waste and other general solid waste (putrescible) were disposed of and collected via Council's weekly scheduled bin collection. Other bulky waste associated with the workshop activities was disposed of in skip bins and transported offsite by a licensed waste transporter. Used printer ink cartridges were disposed of at the designated drop off bin at the local Post Office.

No building or putrescible wastes have been disposed of on the site.

The amount of waste transported off site from the Old Northern Road for disposal, recycled and processed during the monitoring period is contained in Tables 21. The waste tracking register is contained in Appendix L.

Table 21: Old Northern Road – Total waste generated on site, July 2020 to June 2021.

Waste Type	Disposal / Recycling / Processing	Amount of Waste Generated
General Solid Waste - Putrescible	The Hills Shire Council Waste Contractor weekly bin collection (3 x 240L Red bin)	Approx. 78 m^3
General Solid Waste - Recyclables	The Hills Shire Council Waste Contractor fortnightly bin collection (1 x 240L Yellow bin)	Approx. 13 m^3
Scrap Metals	Recycled by Westland Metals	44.9 tonnes
Non-putrescible waste from workshop	Skip Bins provided and picked up by Asquith Mini Skips	62 m^3
Grease	Collected and transported by Grease Eater	3,650 litres
Waste Oil	Collected and transported by Southern Oil	7,000 litres
Sewage	Onsite sewage treatment through EnviroCycle	Estimated to be 0.225 Mega litres (average 15 employees per operating day)
Ink Cartridge	Drop off at Post Office	<0.5 m^3

5.4.2 Waste Importation

DA 250-09-01 does not permit any importation of waste onto the quarry premise.

5.4.3 Changes to Environmental Procedures

No changes to the waste management procedure are proposed for the next 2021-2022 reporting period.

Continued efforts to minimise waste generation and maximise recycling and reuse of materials are to be undertaken such as labelling of bins for waste segregation, waste reduction posters and toolbox talks to raise awareness.

6. Water Management

6.1 Monitoring and Compliance Limits

DA250-09-01 Modification 4 required Dixon Sand to install and monitor 2 additional monitoring bores. Installation and commencement of monitoring of these two additional bores occurred in September 2015.

6.1.1 Groundwater Levels and Criteria / Trigger Levels

Groundwater levels for the Old Northern Road Quarry have been measured on a monthly basis. The groundwater monitoring system comprised initially of five boreholes in 2003. Five additional boreholes were installed and monitored monthly since June 2011. Borehole MW4 has been decommissioned as the area is now under extraction. Boreholes BH8 and BH9 have been installed on Lot 2 to satisfy Condition 3.25 of Schedule 2, DA250-09-01 (Modification 4). Borehole BH2 was damaged in December 2019 due to vehicle strike and therefore monitoring has been suspended until the monitoring well is rectified.

Borehole locations are listed in Table 22.

Table 22: Boreholes for groundwater monitoring at the Old Northern Road quarry.

Monitoring Bore	Location Reference	Borehole Type	Aim of Monitoring
MW1	Quarry Lot 2, southern boundary	Old bore	Localised perched aquifer
MW2	Quarry Lot 1, west of existing house	Old bore	Localised perched aquifer
MW3	DS2, northern boundary of Quarry Lot 1	Old bore	Localised perched aquifer
MW4*	DS3, western boundary of Quarry Lot 2 –	Old bore	Localised perched aquifer
MW5	Quarry Lot 196, south of main dam	Old bore	Localised perched aquifer
BH1	Western boundary of Quarry Lot 196	New bore	Sydney Basin Central Groundwater Source
BH2	Located in Lot 1, DP204159	New bore	Sydney Basin Central Groundwater Source
BH3	Located in Lot 1, DP204159	New bore	Sydney Basin Central Groundwater Source
BH6	Northern boundary of Quarry on Lot 1	New bore	Sydney Basin Central Groundwater Source
BH7	Southern boundary of Quarry on Lot 2	New bore	Sydney Basin Central Groundwater Source
BH8	Within the 100m buffer to MTSGS on Lot 2	New bore	Localised perched aquifer
BH9	Within the 100m buffer to MTSGS on Lot 2	New bore	Deeper bore targeting the Sydney Basin Central Groundwater Source

Note: MW4 decommissioned due to its location being in the active extraction area.*

The baseline groundwater level statistics with the 20th and 80th percentile results are listed in Table 23.

Table 23: Baseline Groundwater Level Statistics and Trigger Values (2003 – 2020)

Monitoring Bore	Minimum	20th Percentile	50th Percentile	80th Percentile	Maximum
MW1	173.1	176.0	177.5	178.3	180.0
MW2	191.2	194.3	199.0	200.3	202.1
MW3	173.6	175.1	177.4	178.4	180.3
MW5	158.4	162.1	162.6	162.9	164.0
BH1	106.1	106.2	106.2	107.1	107.5
BH2	162.1	165.0	165.0	166.7	167.9
BH3	158.1	160.5	161.0	161.7	162.1
BH6	161.7	164.1	164.7	165.5	166.2
BH7	157.0	160.0	160.4	161.2	162.1
BH8	189.2	189.5	189.8	189.9	190.3
BH9	157.8	161.3	163.0	163.8	164.4

6.1.2 Groundwater Quality and Criteria / Trigger Levels

The Soil and Water Management Plan requires groundwater quality sampling to be undertaken on a 6-monthly basis. Groundwater quality sampling was undertaken in December 2020 and June 2021. Groundwater samples were obtained and sampled by a NATA qualified laboratory for analysis of electrical conductivity, total suspended solids and turbidity. pH measurements were taken in the field due to short sample holding time. Table 24 contains that baseline groundwater quality statistics and trigger values.

Table 24: Baseline Groundwater Quality Statistics and Trigger Values (2010 – 2020)

Monitoring Bore	pH			Electrical Conductivity (µS/c)		
	20th Percentile	50th Percentile	80th Percentile	20th Percentile	50th Percentile	80th Percentile
MW1	4.0	4.1	4.6	206	249	271
MW2	3.7	3.9	4.5	239	560	618
MW3	5.2	5.6	6.1	129	141	160
MW5	4.4	5.1	5.4	135	151	213
BH1	6.0	6.1	6.6	161	185	214
BH2	4.9	5.7	7.1	262	293	325
BH3	5.9	6.0	6.9	176	186	269

BH6	5.2	5.5	5.8	120	127	156
BH7	4.4	4.8	5.8	242	252	258
BH8	3.9	4.0	4.1	267	278	291
BH9	5.4	5.5	5.6	262	269	275

6.1.3 Surface Water Monitoring and Discharge Event

Condition M2.3 of EPL 3916 requires Dixon Sand to monitor (by sampling and obtaining results by analysis) the concentration of the pollutants utilising the specified methodology, units of measure and sampling frequency outlined in Table 25. Water discharged at the main storage dam weir must meet these criteria outlined in the EPL 3916. Water sampling at the EPA licensed discharge point is to be obtained and analysed against the criteria in Condition L2.4 of EPL 3916 prior to being discharged from the main water storage dam, as listed Table 26.

Table 25: EPL 3916 Surface water sampling requirement at LDP01.

Pollutant	Units of Measure	Frequency	Sampling Method
pH	pH	Daily during any discharge	Grab sample
Total Suspended Solids	Milligrams per litre	Daily during any discharge	Grab sample
Turbidity	Nephelometric turbidity units	Daily during any discharge	Grab sample

Table 26: EPL 3916 Surface water discharge criteria.

Pollutant	Units of Measure	100th Percentile concentration limit
pH	pH	4.5 – 6.5
Total Suspended Solids	milligrams per litre	50

6.2 Extraction Limits

Old Northern Road Extraction Limits

Extraction limits for the Old Northern Road quarry are defined by DA250-09-01 and listed in Table 27 below.

Table 27: Old Northern Road Quarry Extraction limits

DA250-09-01 Conditions	Extraction limit
Condition 17 of Schedule 2	Extraction below a depth of 15.24 m below original ground level is restricted to Lot 196 DP 752025 within the hatched area shown in the figure in Appendix 2 and to a depth not greater than 127.5 m AHD.
Condition 18 of Schedule 2	Extraction on Lot 29 DP 752025 is limited to a depth not greater than 15.24 m below original ground level.
Condition 19 of Schedule 2	Extraction on Lots 1 and 2 DP 547255, with the exception of the MTSGS buffer zone, is limited to a depth not greater than 170 m AHD in the east, gradually

	reducing to 153 m AHD in the west, and as shown conceptually in the figure in Appendix 4.
Condition 20 of Schedule 2	The Applicant must ensure that no extraction occurs with 2 m of the highest recorded wet weather groundwater level within the MTSGS buffer zone.
Condition 21 of Schedule 2	The Applicant must: (a) establish the highest recorded wet weather groundwater level within the MTSGS buffer zone based on all available (and at least 12 months) site specific groundwater monitoring data; (b) engage a suitably qualified and experienced expert to establish the maximum depths to which extraction can be undertaken within the MTSGS buffer zone to comply with condition 20 above; and (c) submit a Maximum Extraction Depth Map (contour map or similar) for the development, which demonstrates compliance with conditions 17 to 20 above (inclusive), to the Secretary for approval within 3 months of the approval of Modification 5.
Condition 22 of Schedule 2	The Applicant must comply with the extraction depths specified in the Maximum Extraction Depth Map to the satisfaction of the Secretary.

Notwithstanding Condition 17 of Schedule 2 of DA250-09-01, Licence 627635 was granted by Department of Planning, Industry and Environment (Crown Lands) and commenced on 4th June 2021 permitting Dixon Sand to undertake extraction of the area hatched on Lot 196 (Appendix 2 of DA 250-09-01) beyond the depth of 15.24 m below original ground level.

6.3 Results

6.3.1 Groundwater Levels

Chart 19 depicts the long term recorded groundwater levels, with monitoring commencing in June 2003. Charts 20 to 30 (inclusive) illustrate the groundwater levels for all monitoring bores for this reporting period.

6.3.2 Groundwater Quality

Chart 31 displays the long-term pH results for all monitoring bores from June 2010 to June 2021. Charts 32 to 42 (inclusive) show the pH results and trigger values for each bore for this reporting period.

Chart 43 presents the long-term electrical conductivity results for all monitoring bores from June 2010 to June 2021. Charts 44 to 54 (inclusive) show the electrical conductivity results and trigger values for each bore for this reporting period.

6.3.3 Surface Water Monitoring

Charts 55 to 58 (inclusive) illustrate the pH, electrical conductivity, turbidity and total suspended solids of the water samples obtained from the surface monitoring location SW19.

6.3.4 Water Discharge Events

No water discharge events occurred in the reporting period.

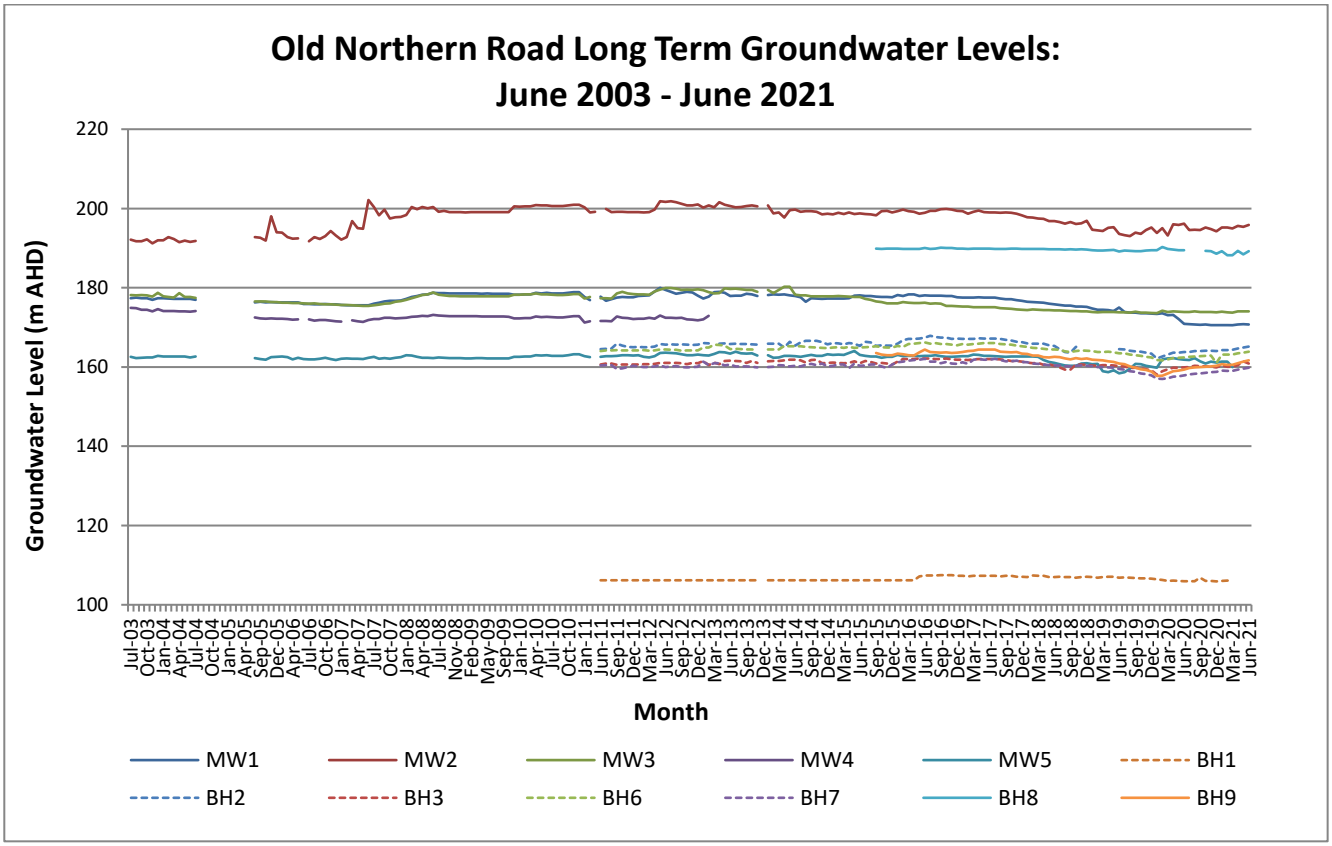


Chart 19: Long Term Groundwater Levels – all Boreholes.

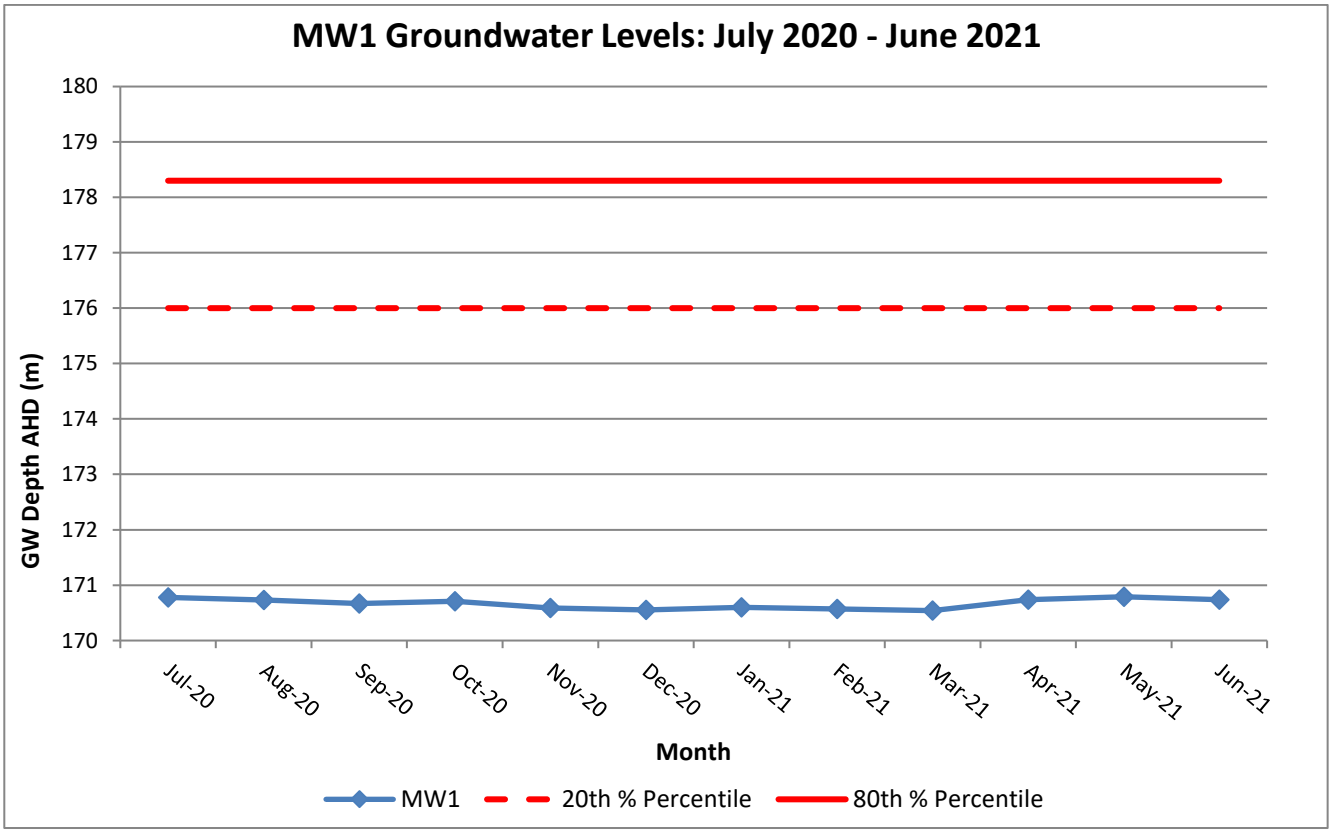


Chart 20: MW1 Groundwater Levels for July 2020 – June 2021.

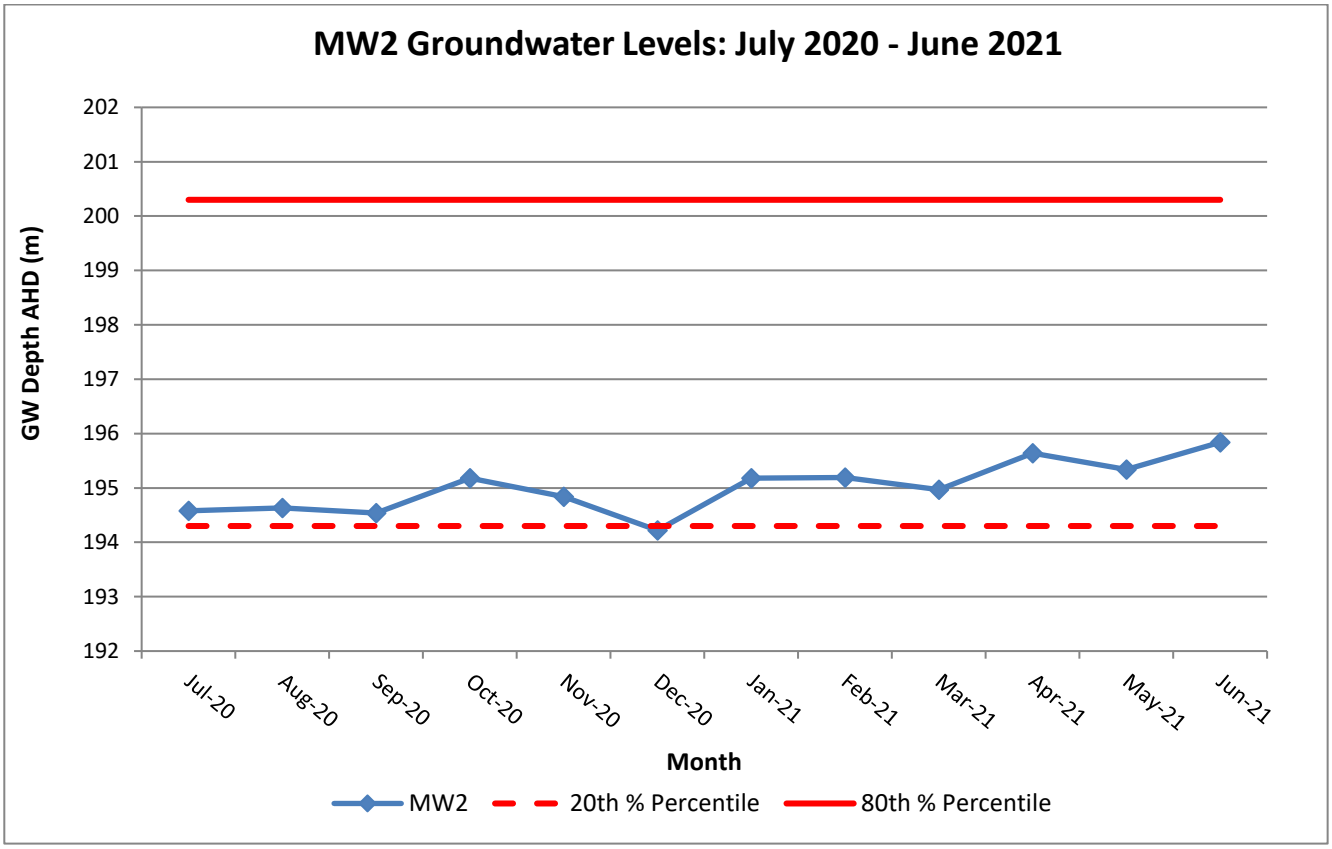


Chart 21: MW2 Groundwater Levels for July 2020 – June 2021.

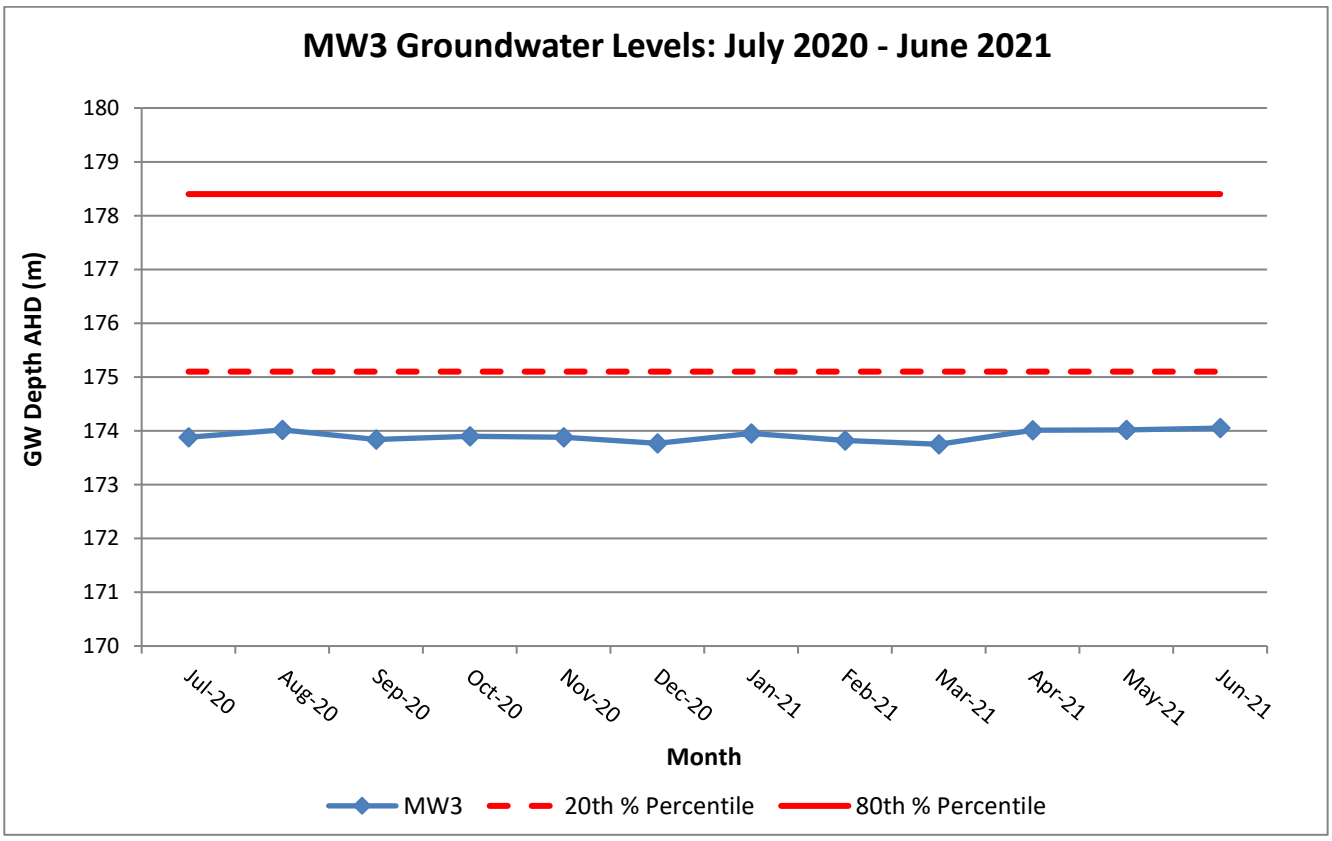


Chart 22: MW3 Groundwater Levels for July 2020 – June 2021.

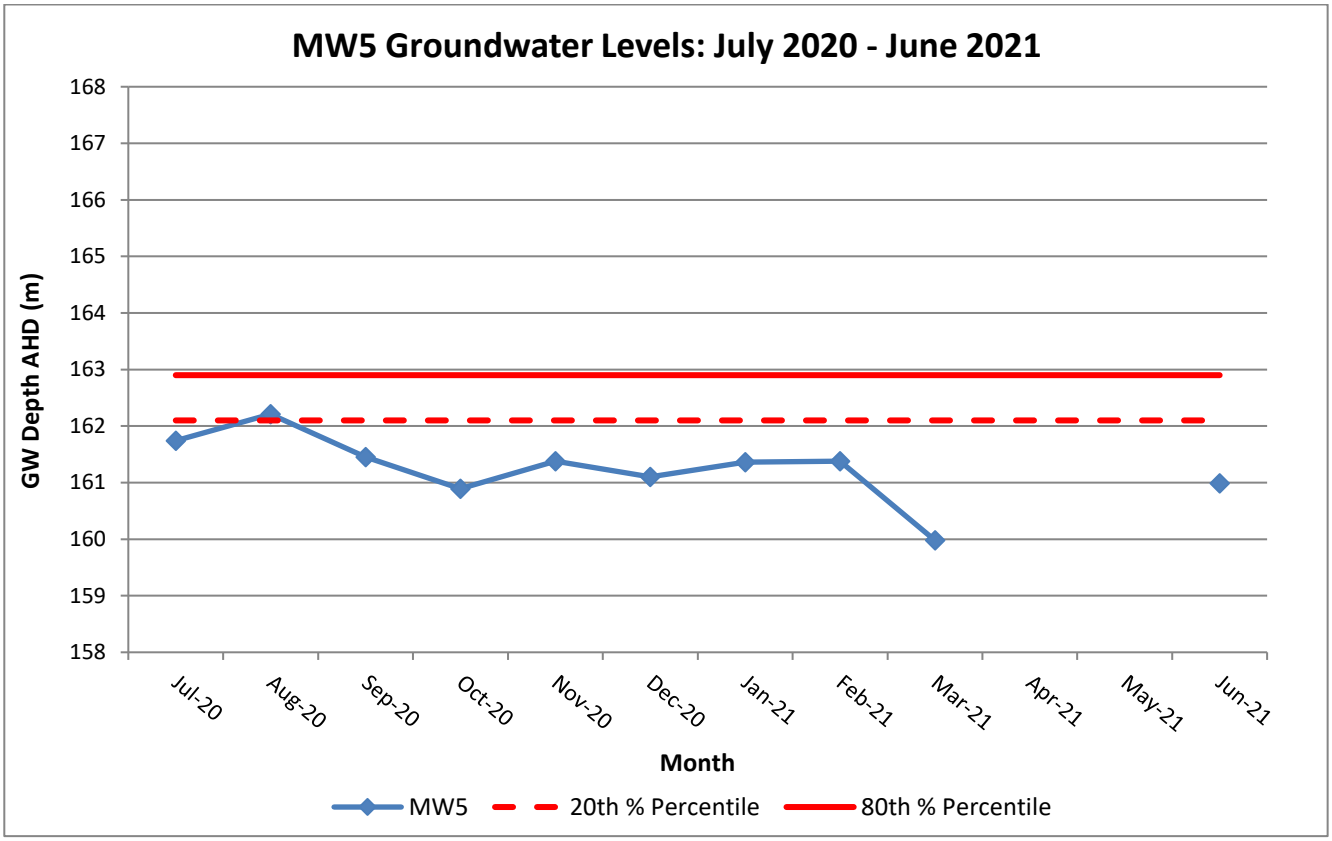


Chart 23: MW5 Groundwater Levels for July 2020 – June 2021.

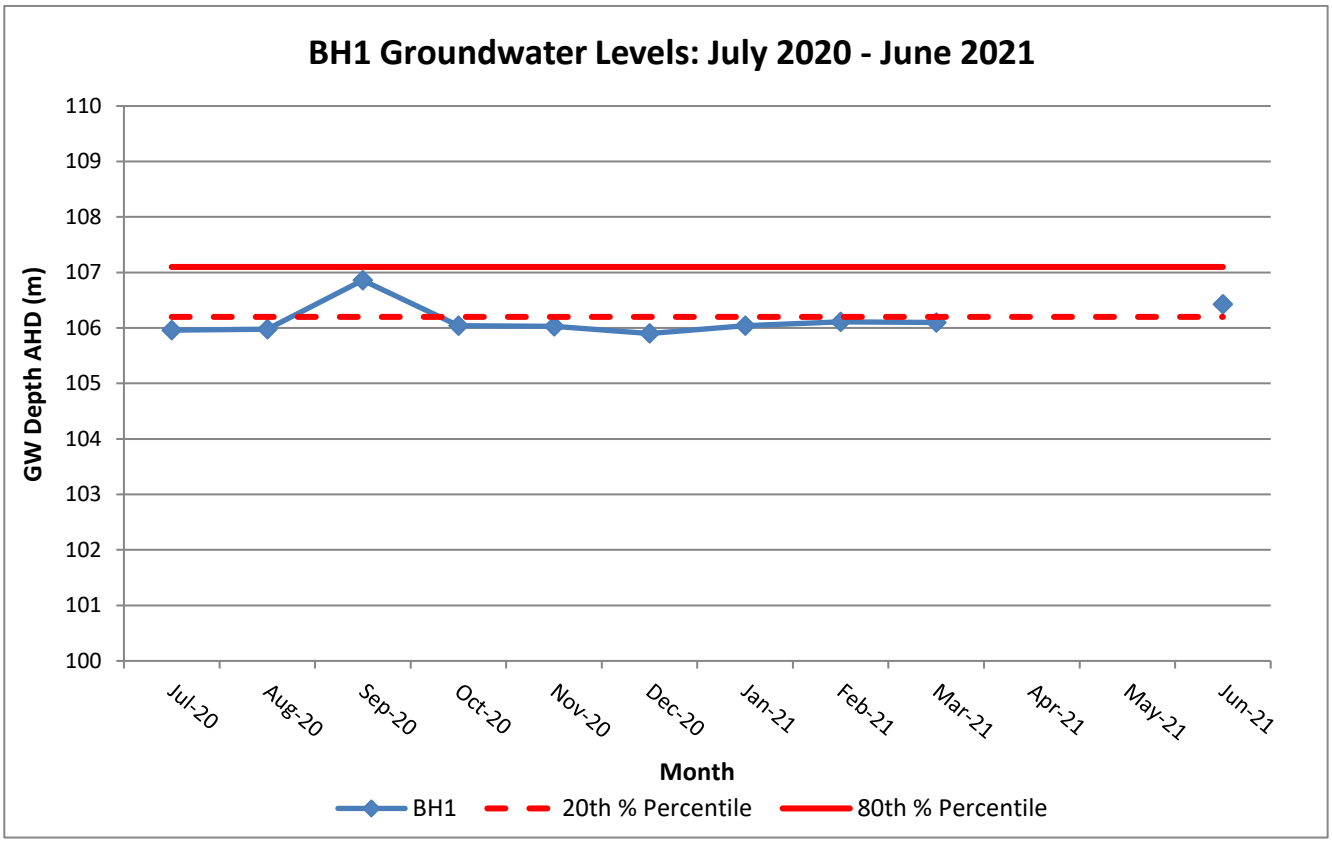


Chart 24: BH1 Groundwater Levels for July 2020 – June 2021.

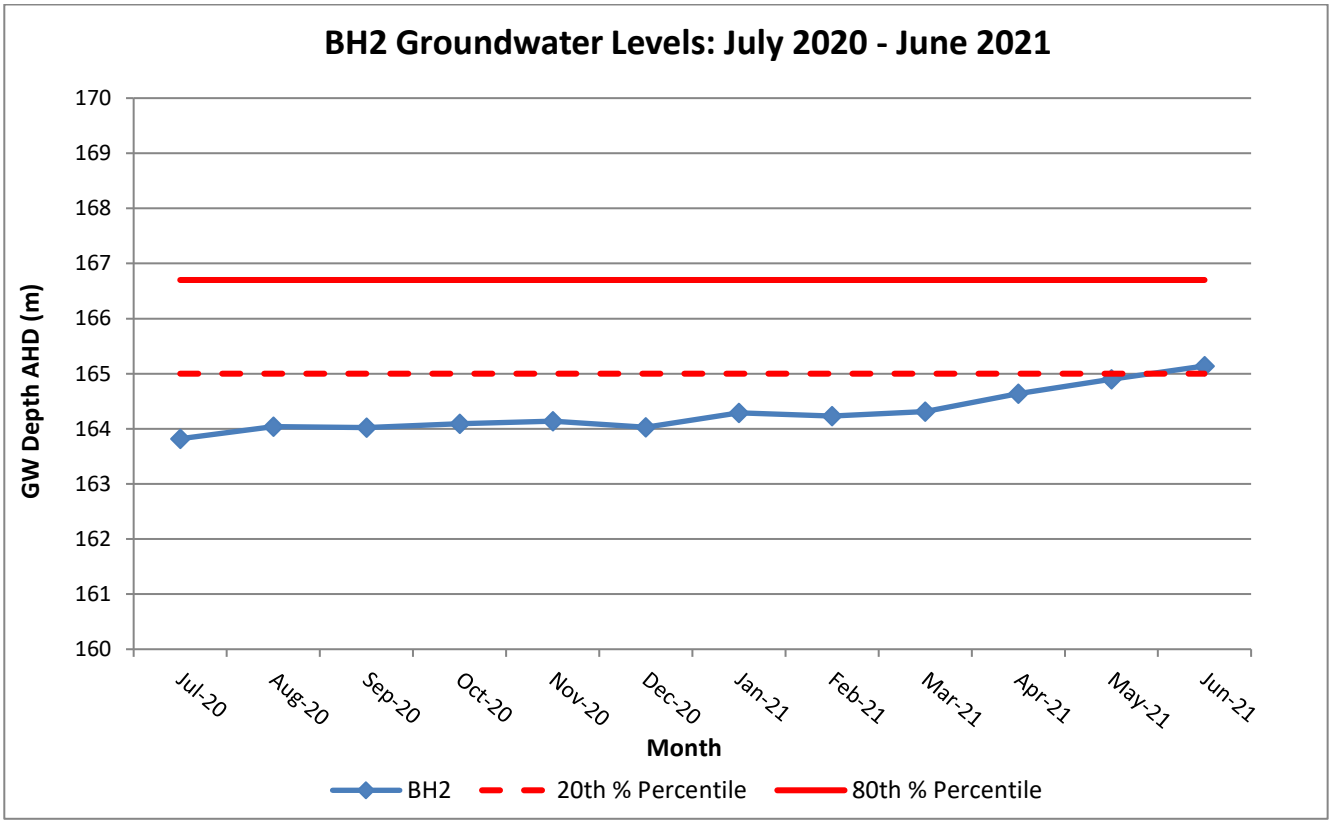


Chart 25: BH2 Groundwater Levels for July 2020 – June 2021.

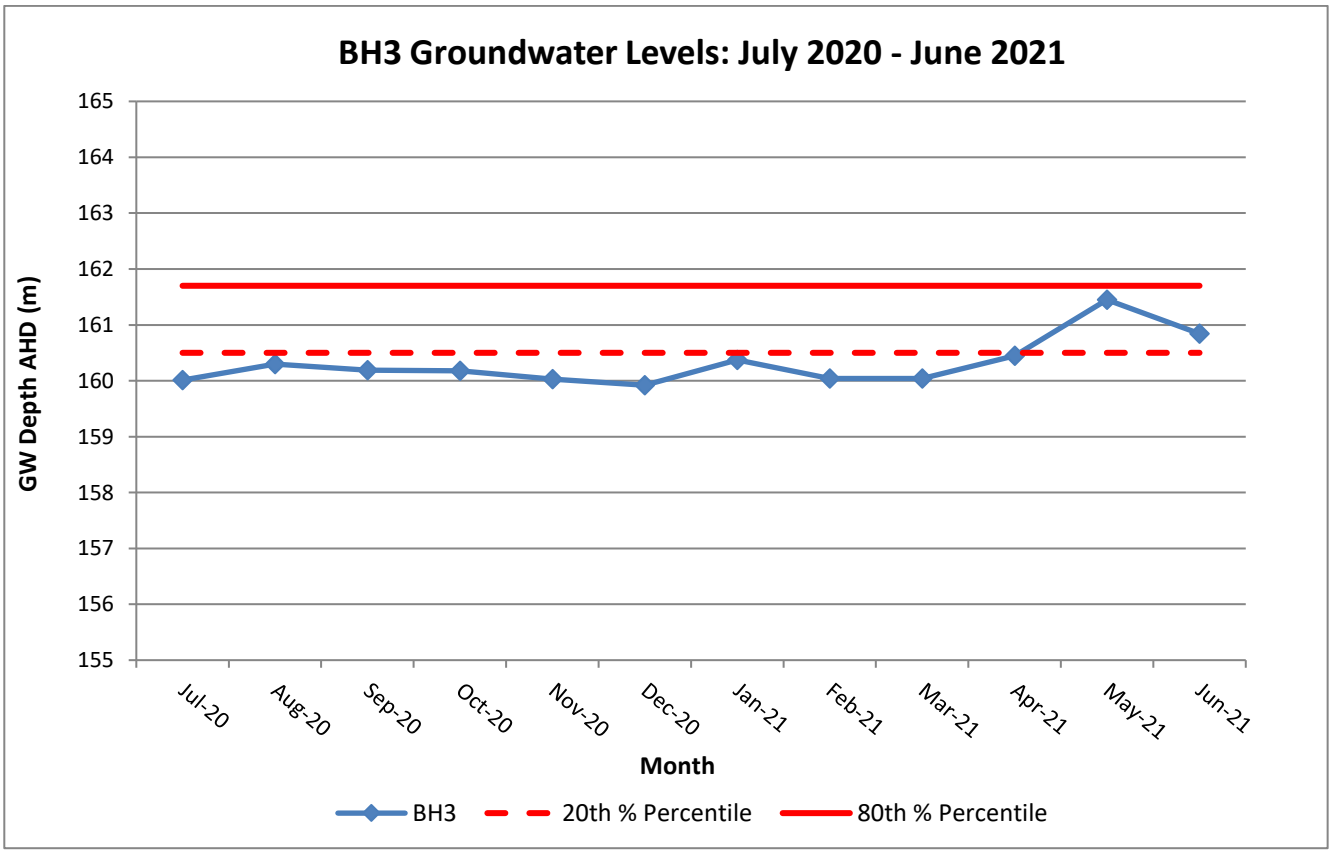


Chart 26: BH3 Groundwater Levels for July 2020 – June 2021.

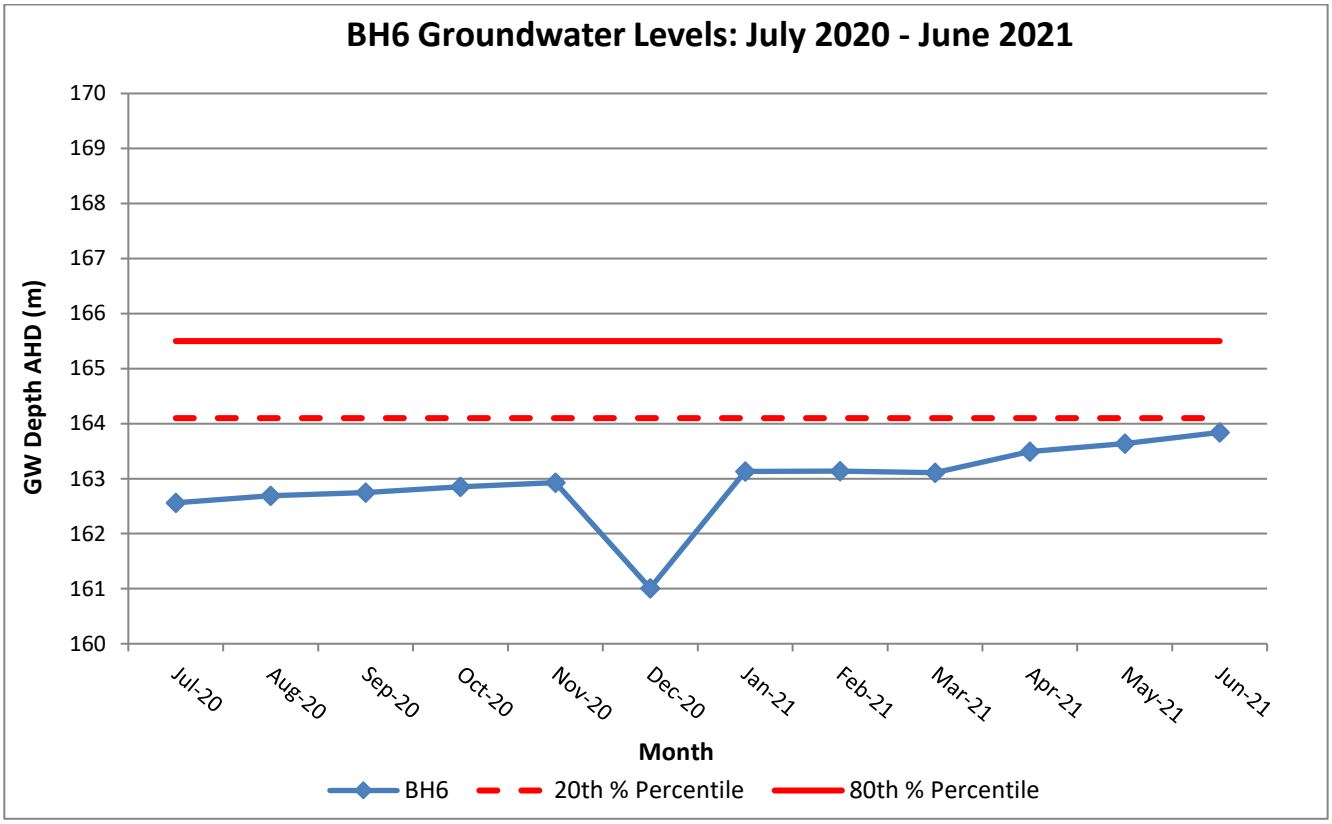


Chart 27: BH6 Groundwater Levels for July 2020 – June 2021.

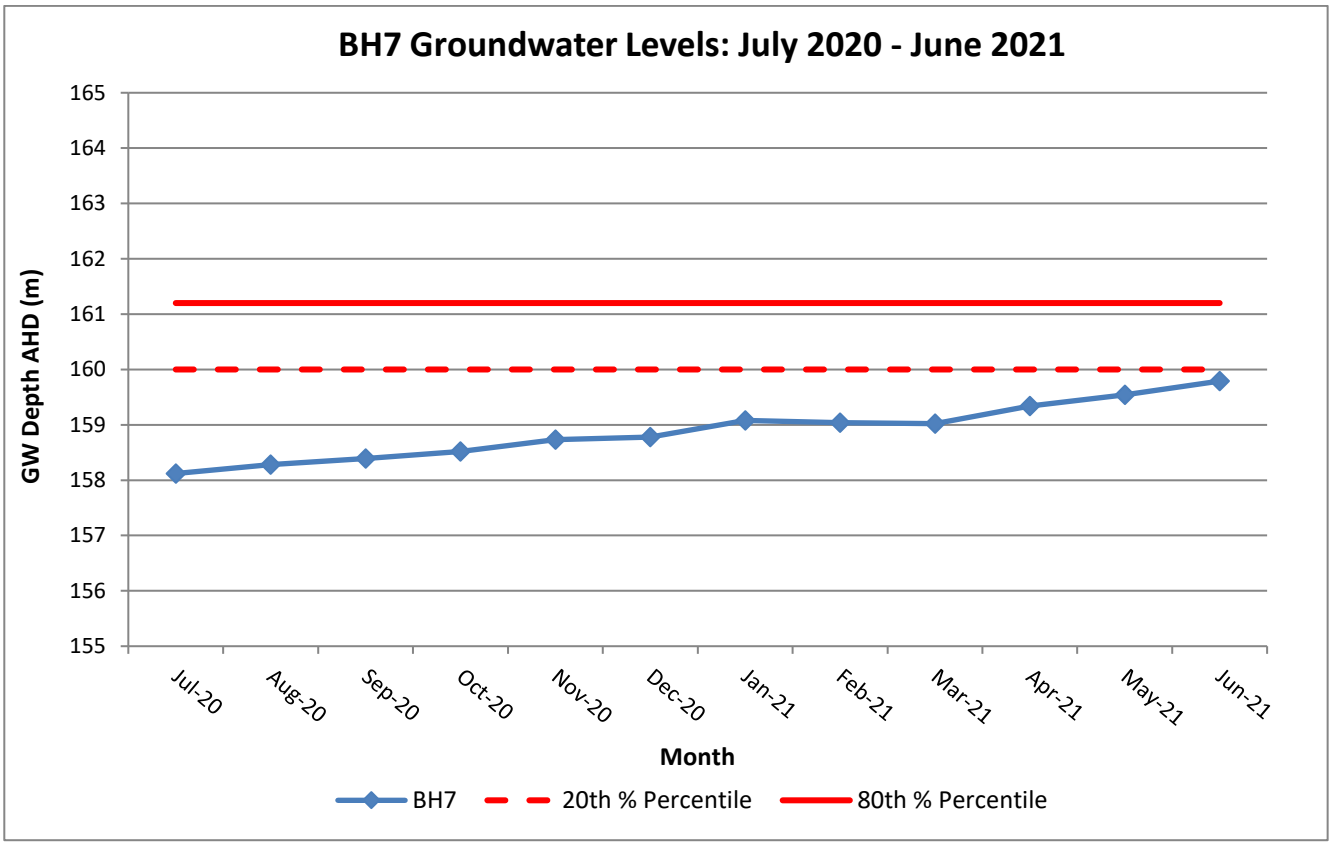


Chart 28: BH7 Groundwater Levels for July 2020 – June 2021.

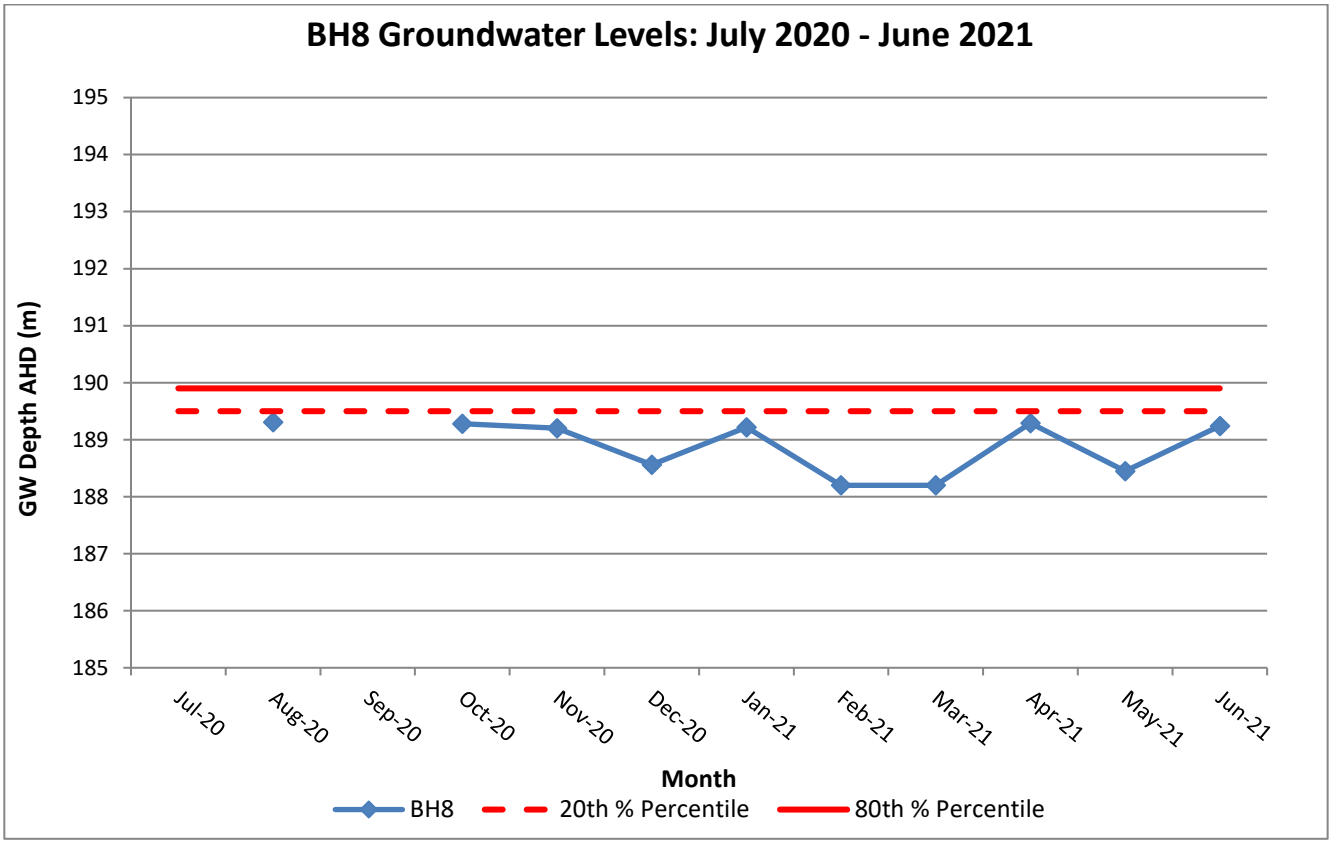


Chart 29: BH8 Groundwater Levels for July 2020 – June 2021.

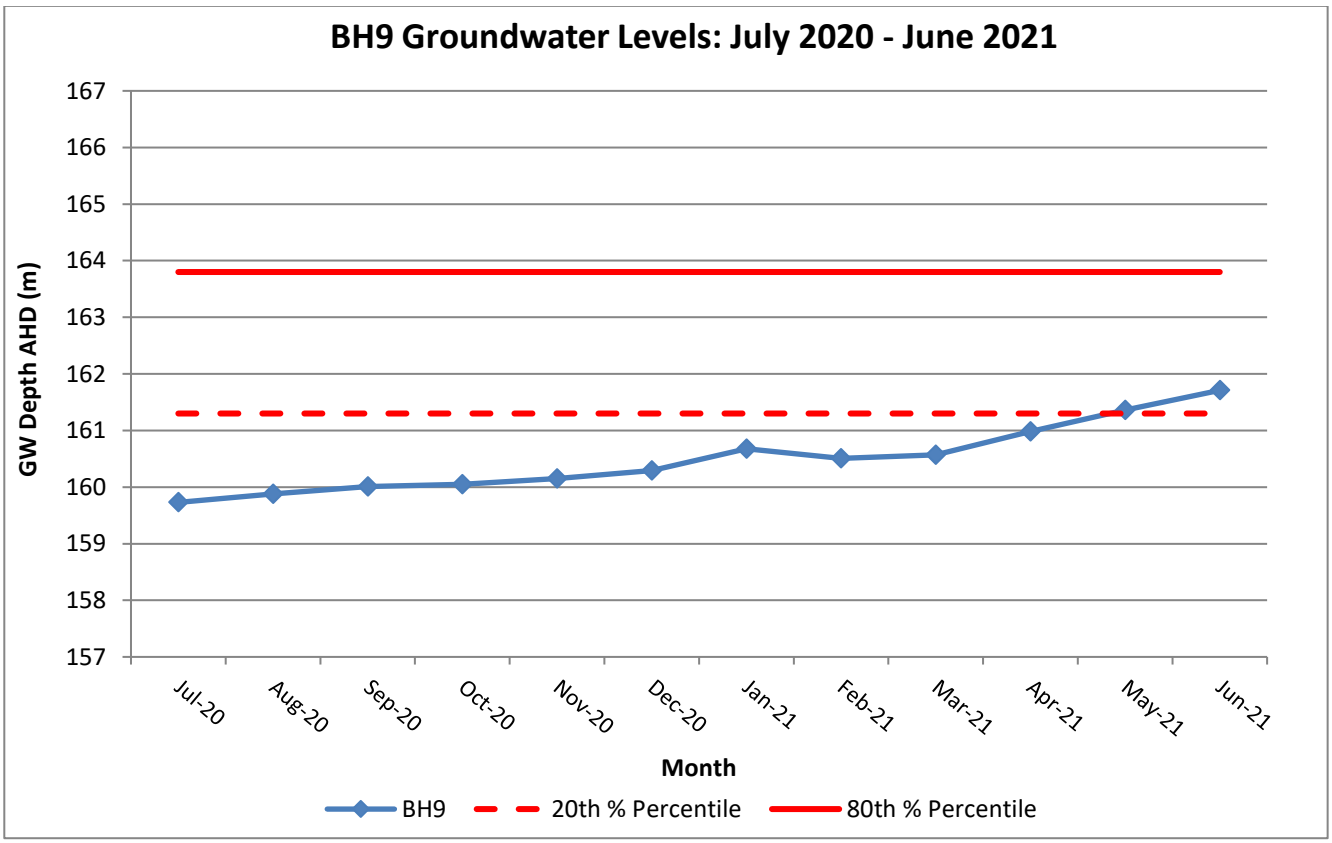


Chart 30: BH9 Groundwater Levels for July 2020 – June 2021.

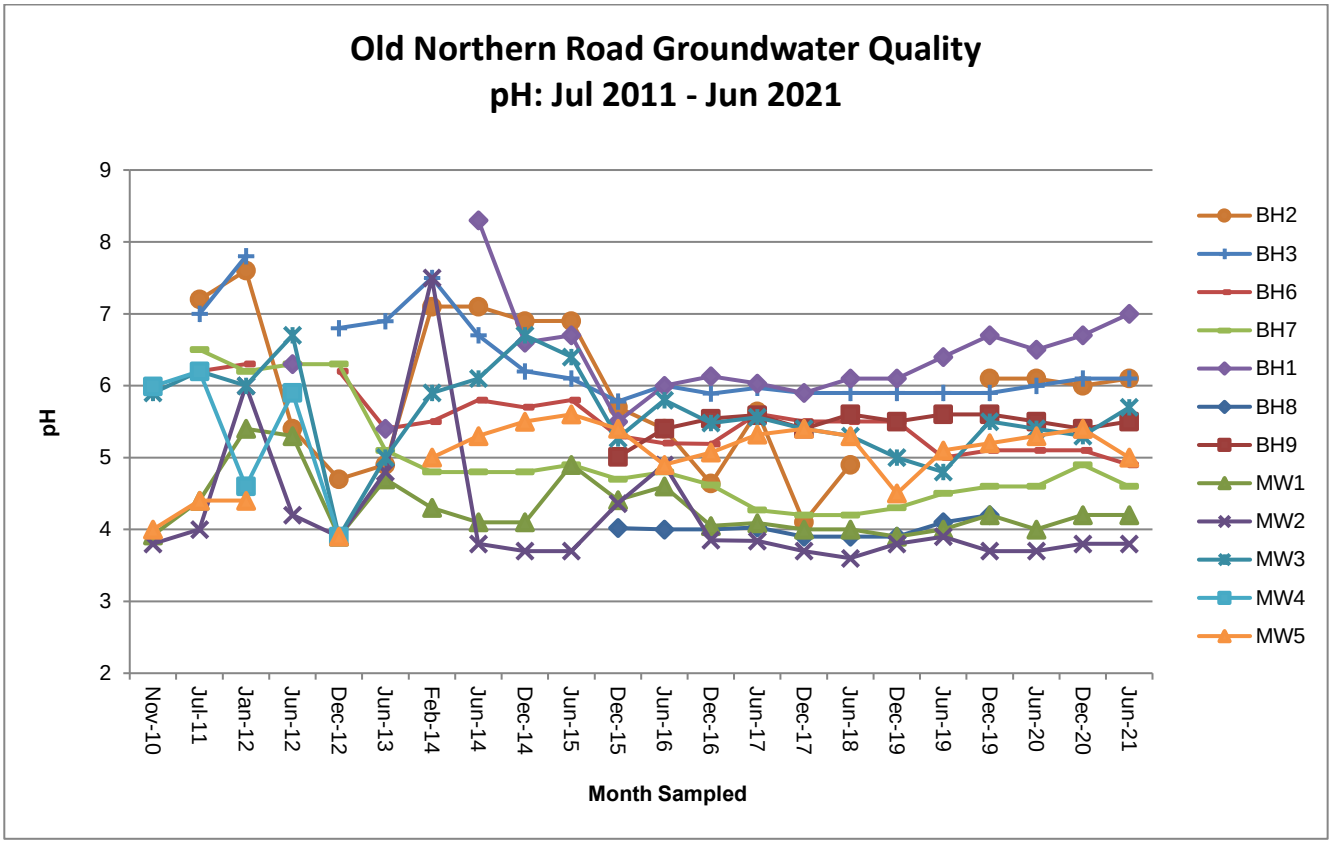


Chart 31: Long term pH results.

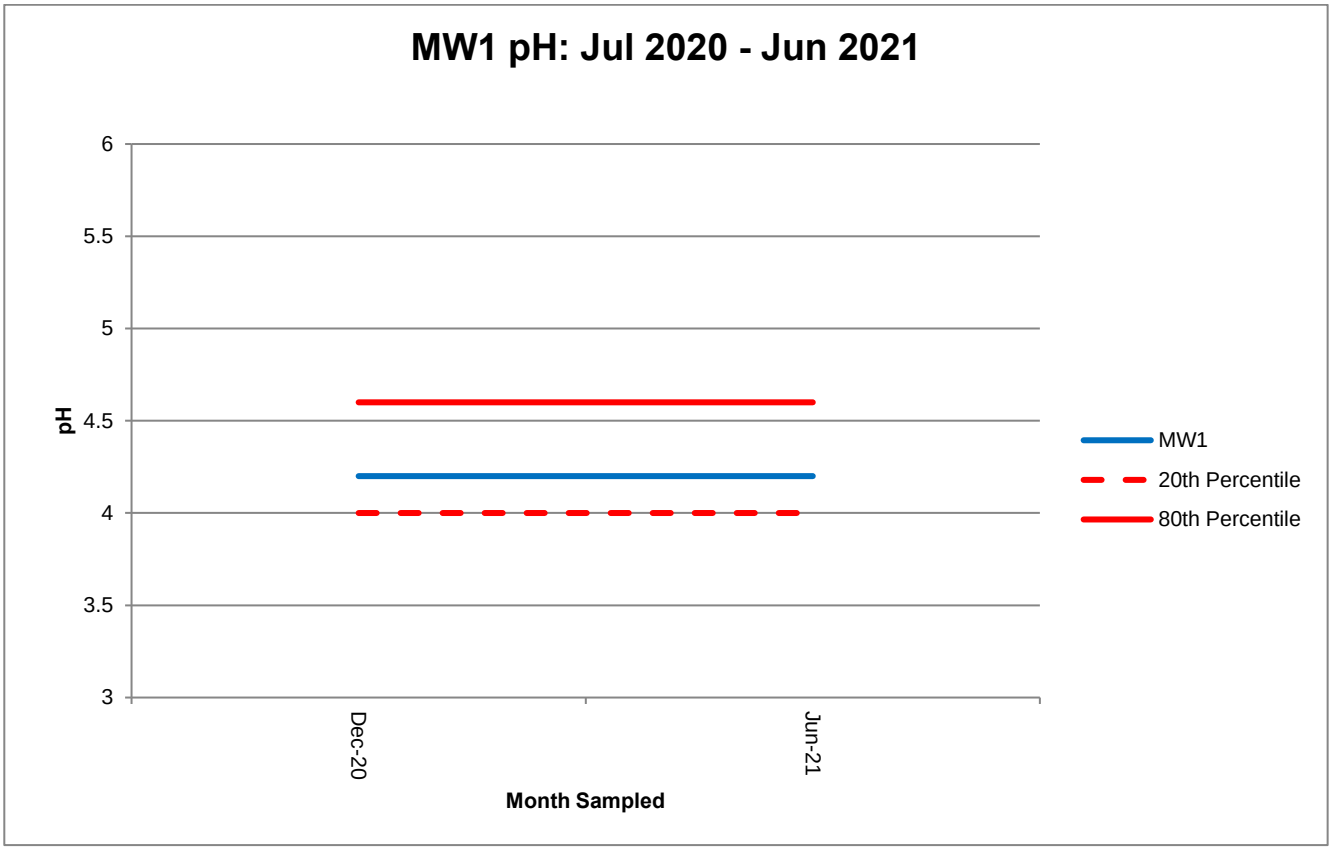


Chart 32: MW1 pH Results July 2020 – June 2021.

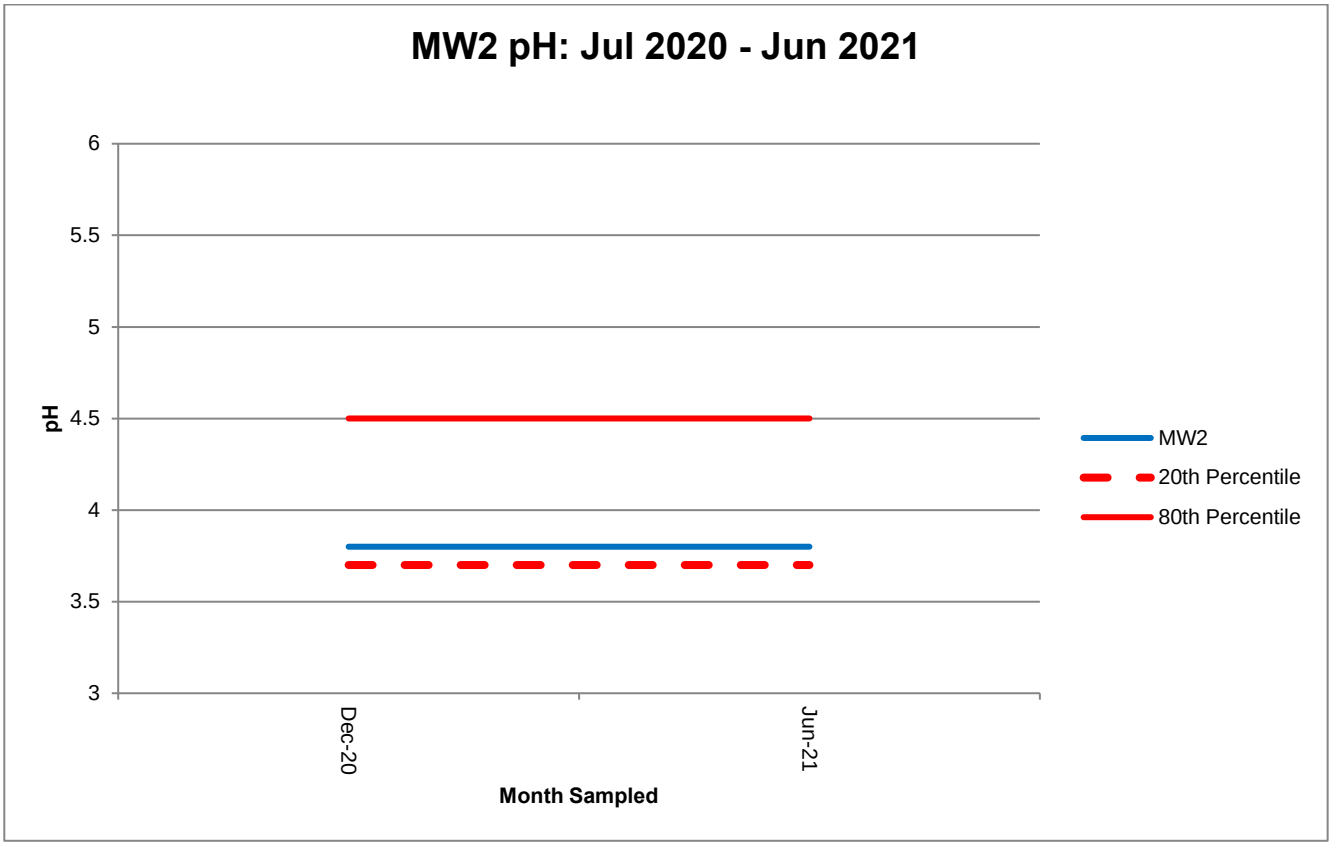


Chart 33: MW2 pH Results July 2020 – June 2021.

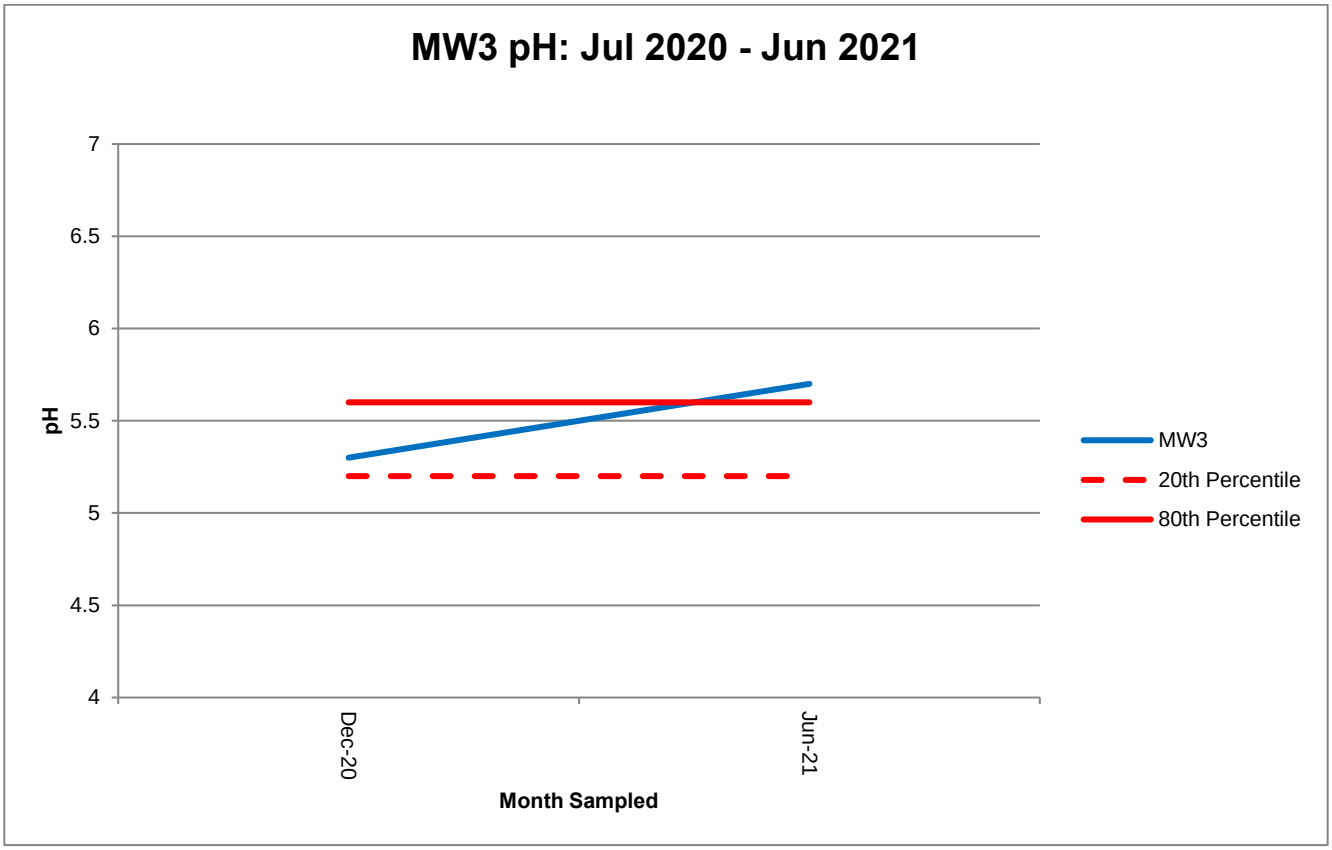


Chart 34: MW3 pH Results July 2020 – June 2021.

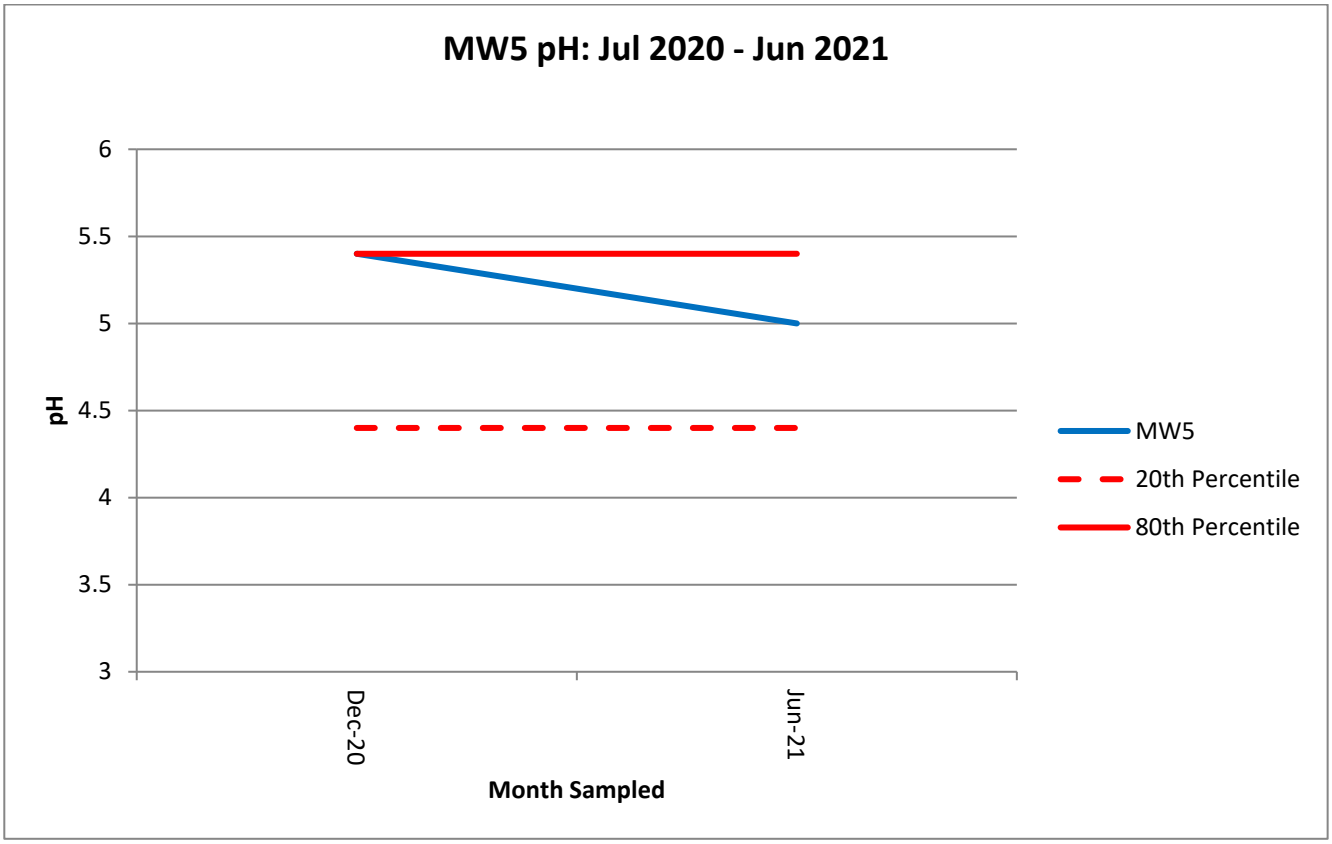


Chart 35: MW5 pH Results July 2020 – June 2021.

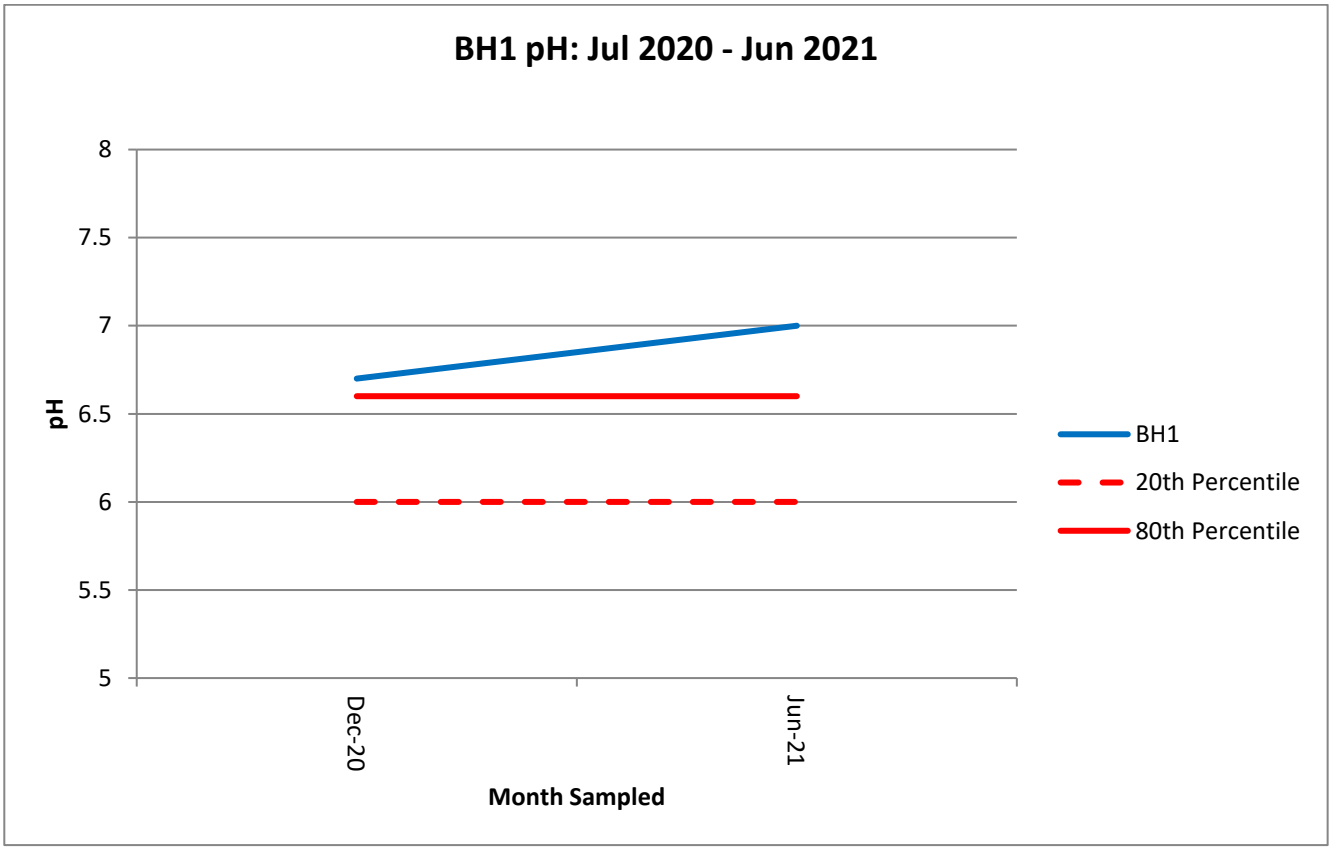


Chart 36: BH1 pH Results July 2020 – June 2021.

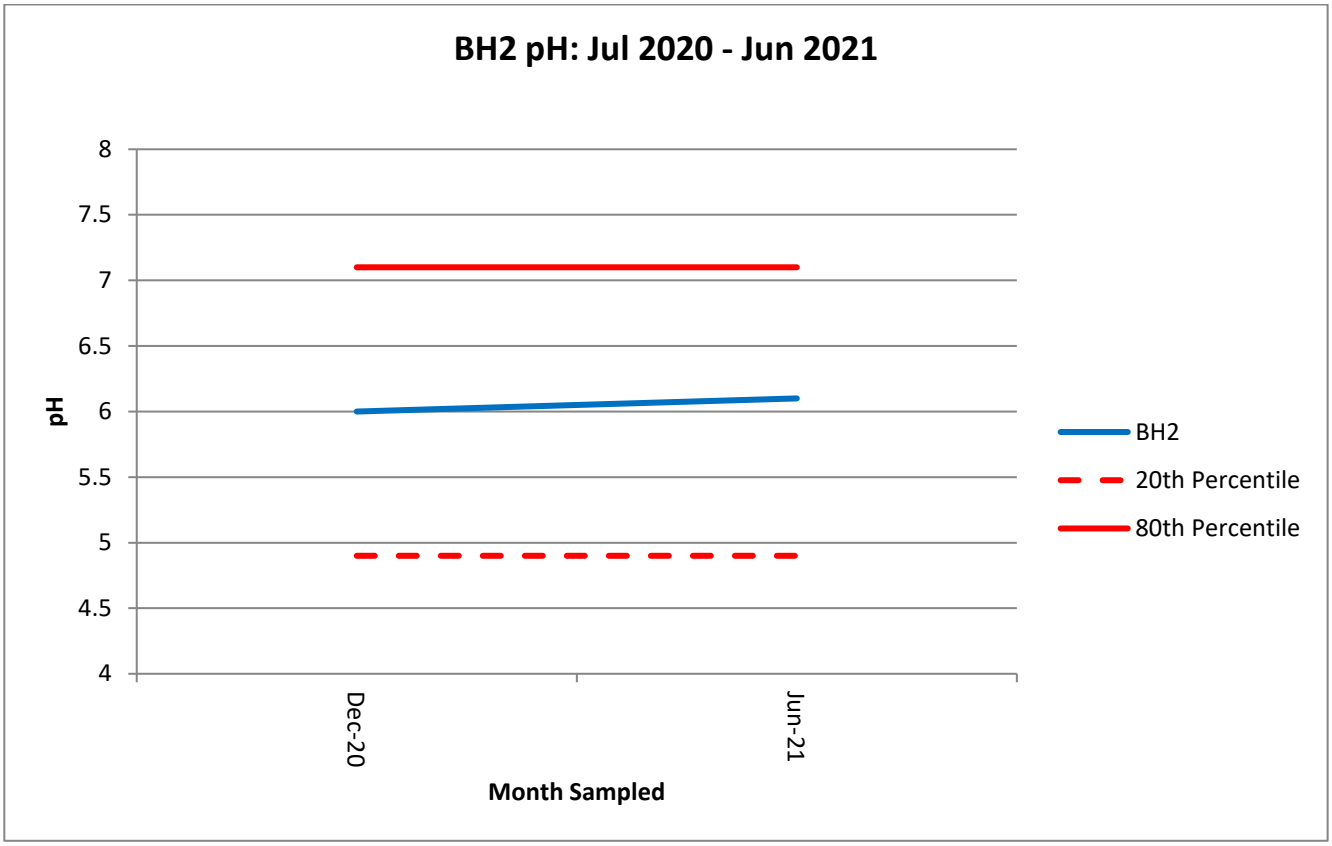


Chart 37: BH2 pH Results July 2020 – June 2021.

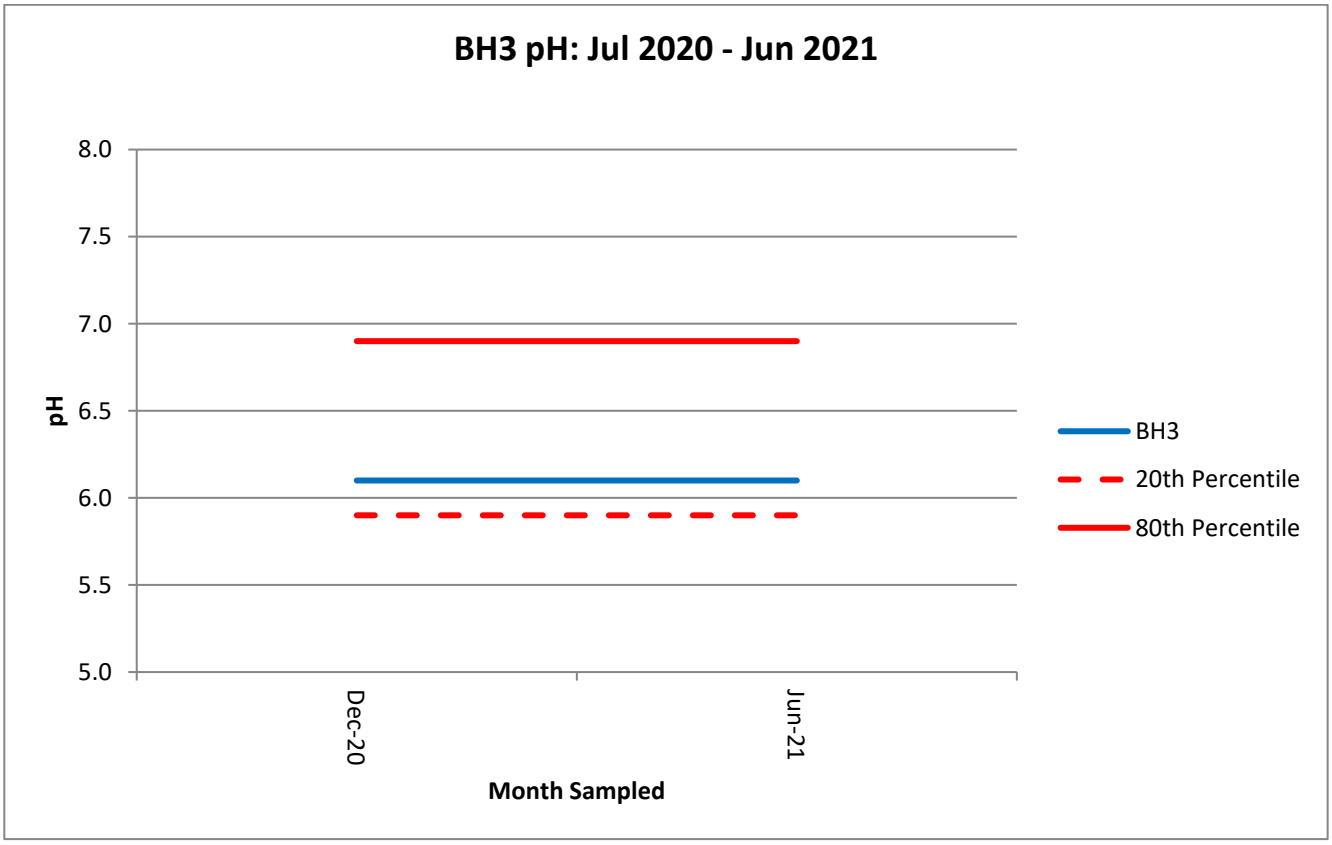


Chart 38: BH3 pH Results July 2020 – June 2021.

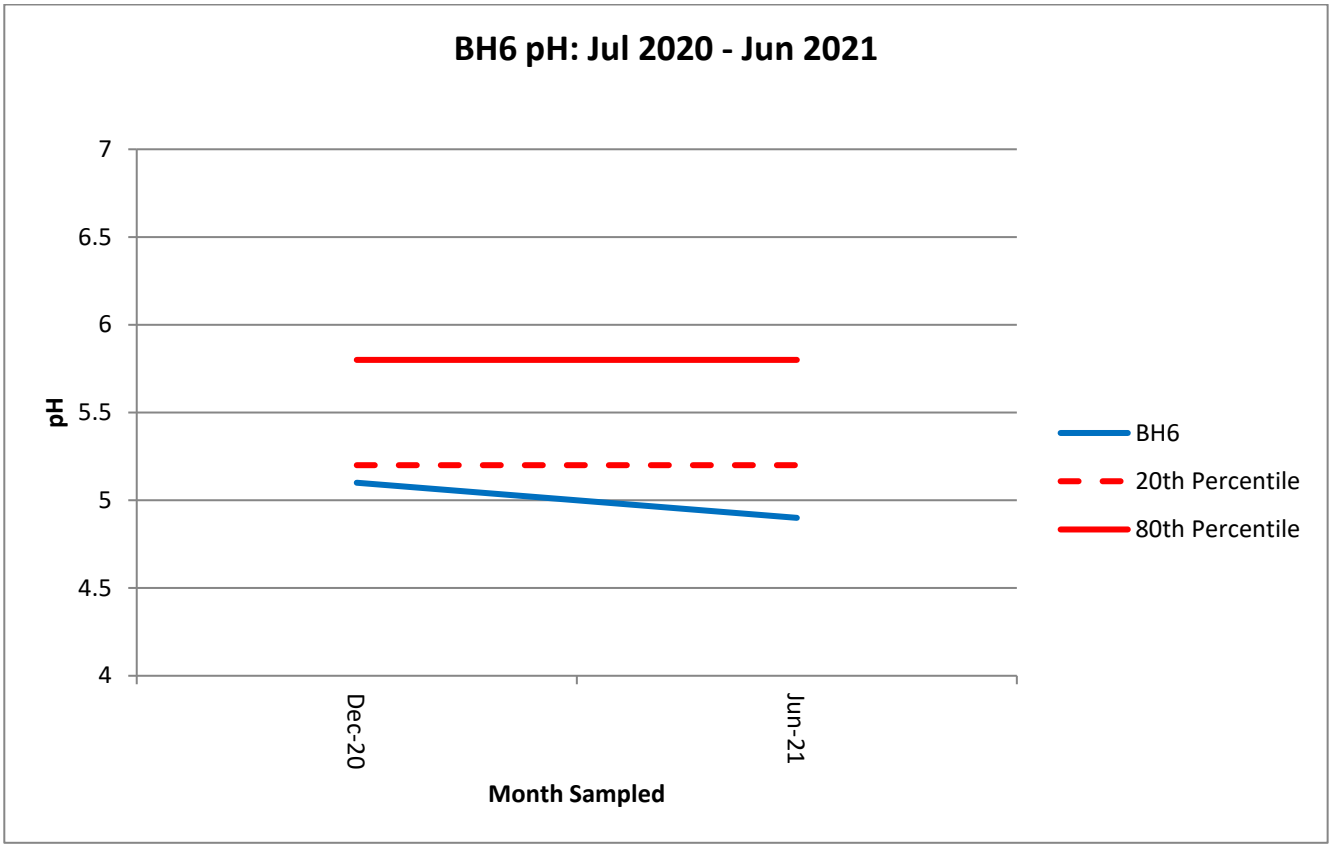


Chart 39: BH6 pH Results July 2020 – June 2021.

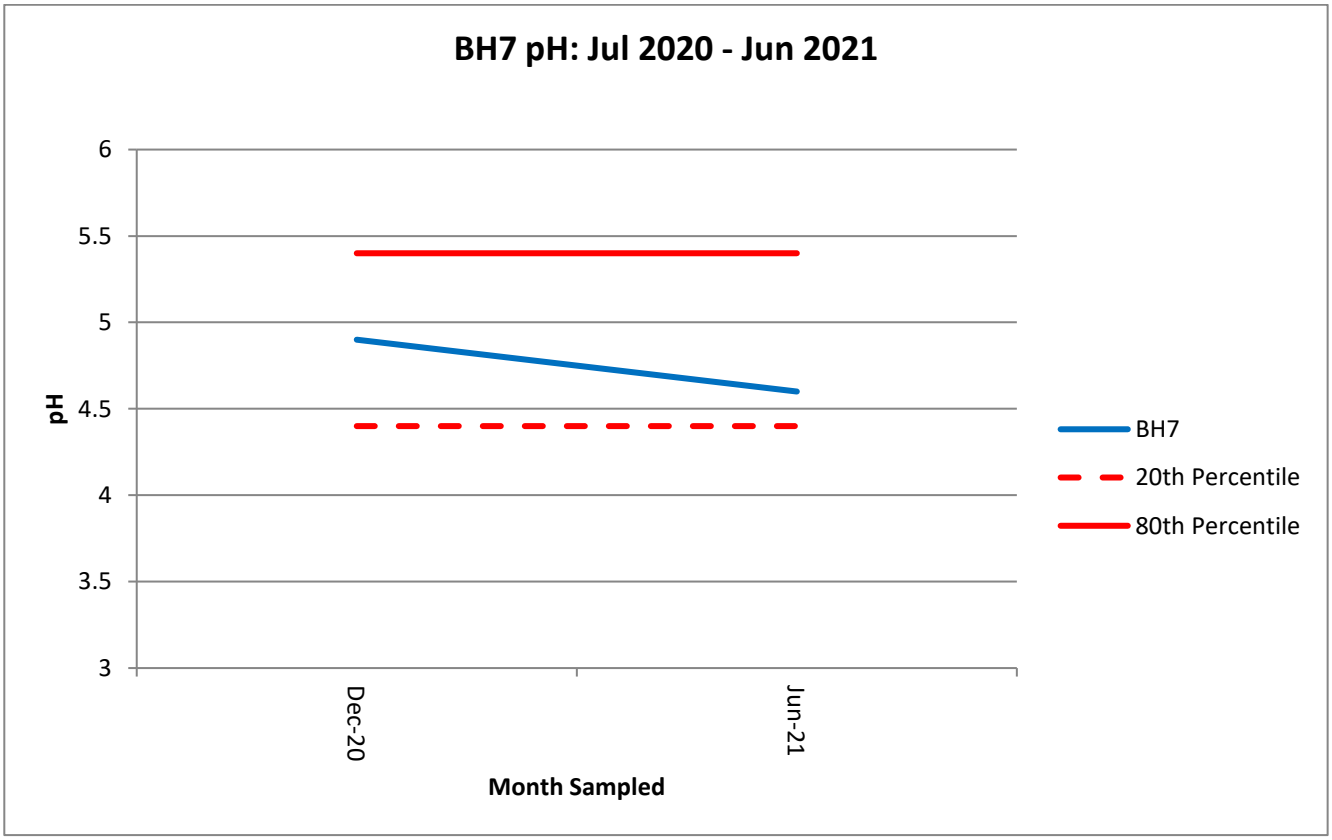


Chart 40: BH7 pH Results July 2020 – June 2021.

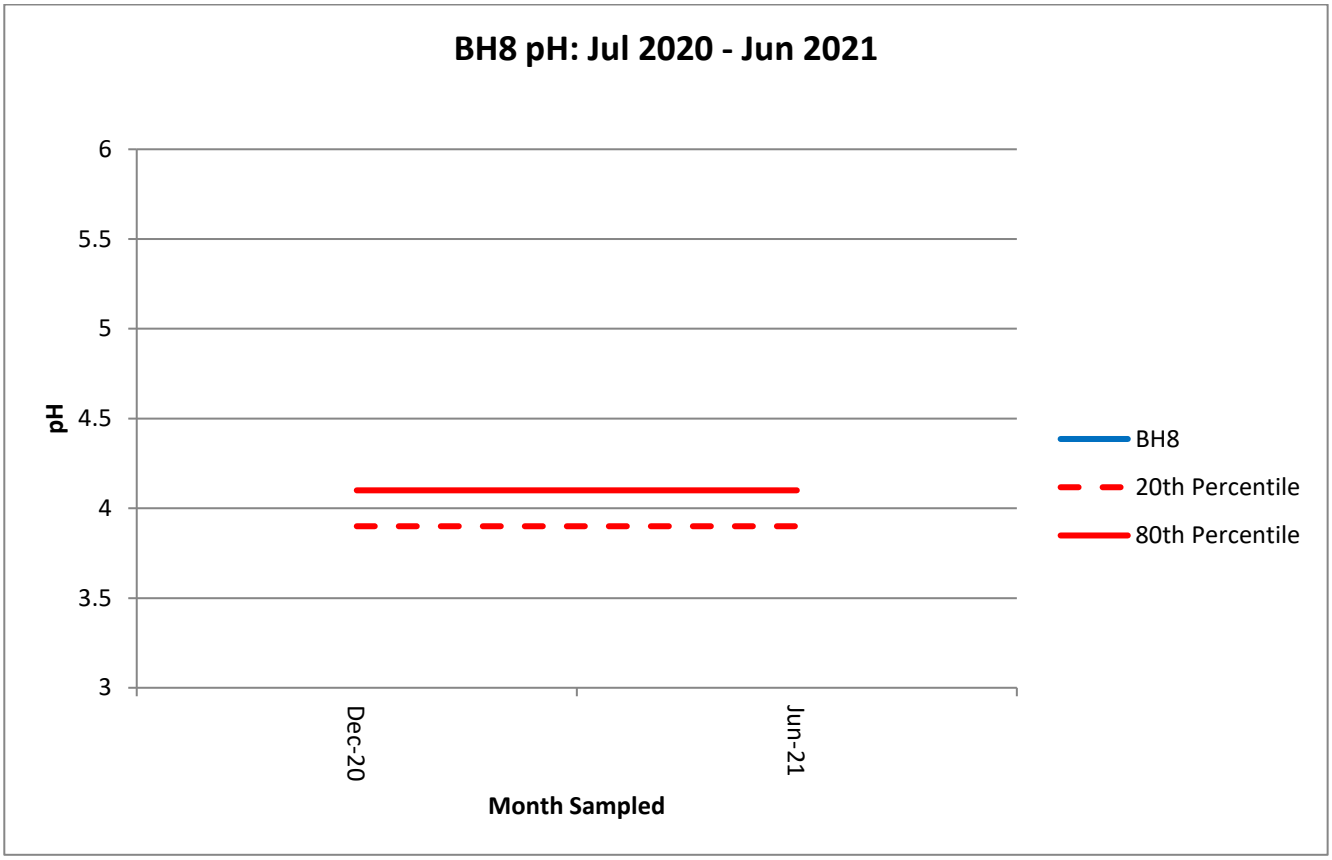


Chart 41: BH8 pH Results July 2020 – June 2021.

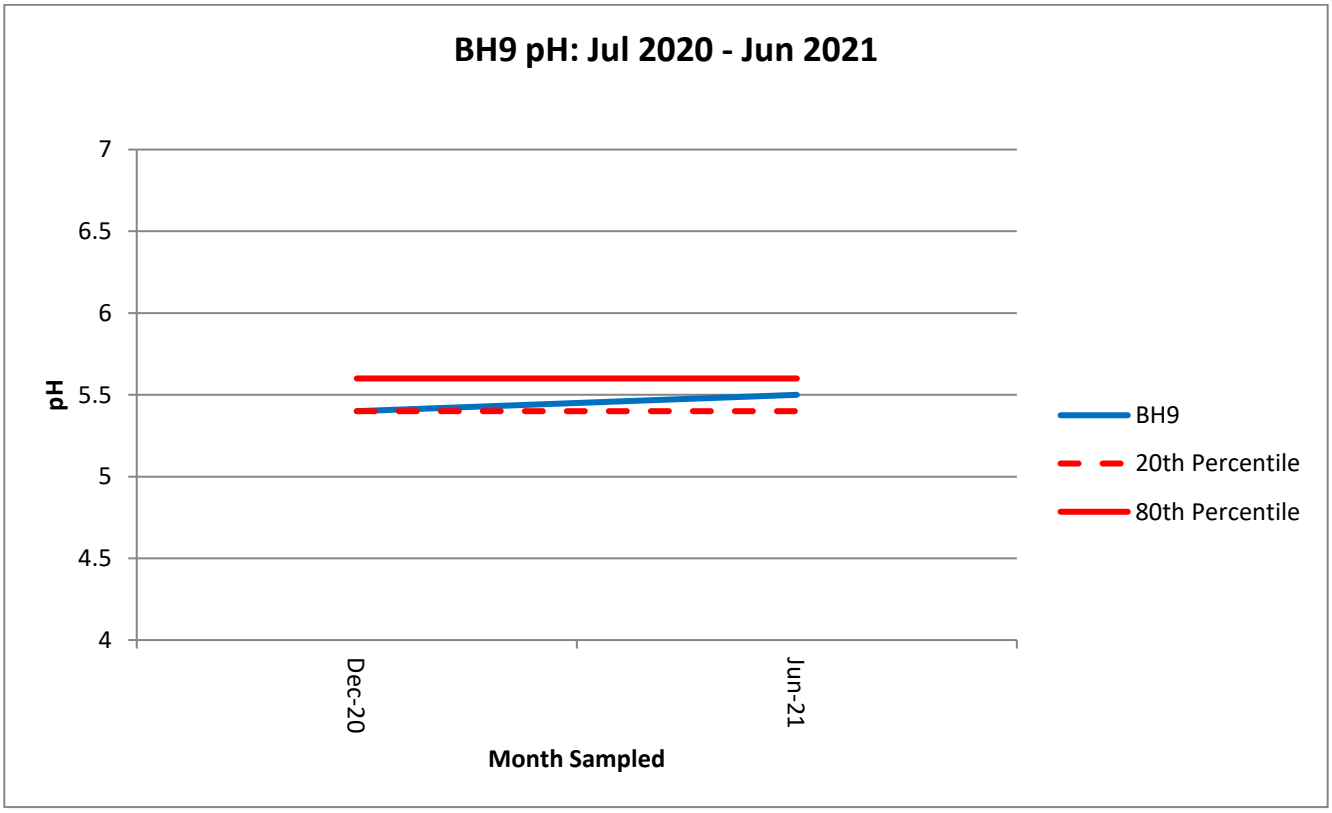


Chart 42: BH9 pH Results July 2020 – June 2021.

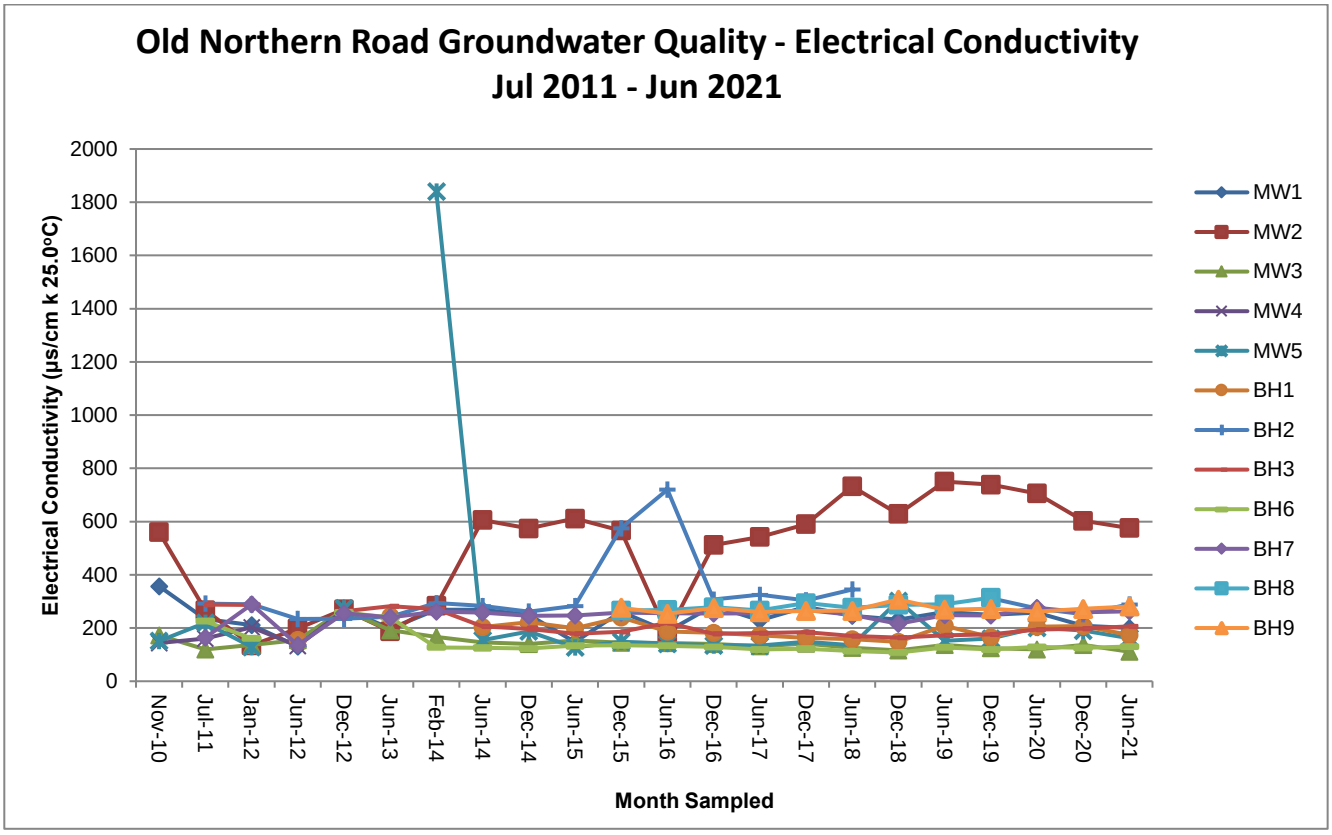


Chart 43: Long term Electrical Conductivity Results.

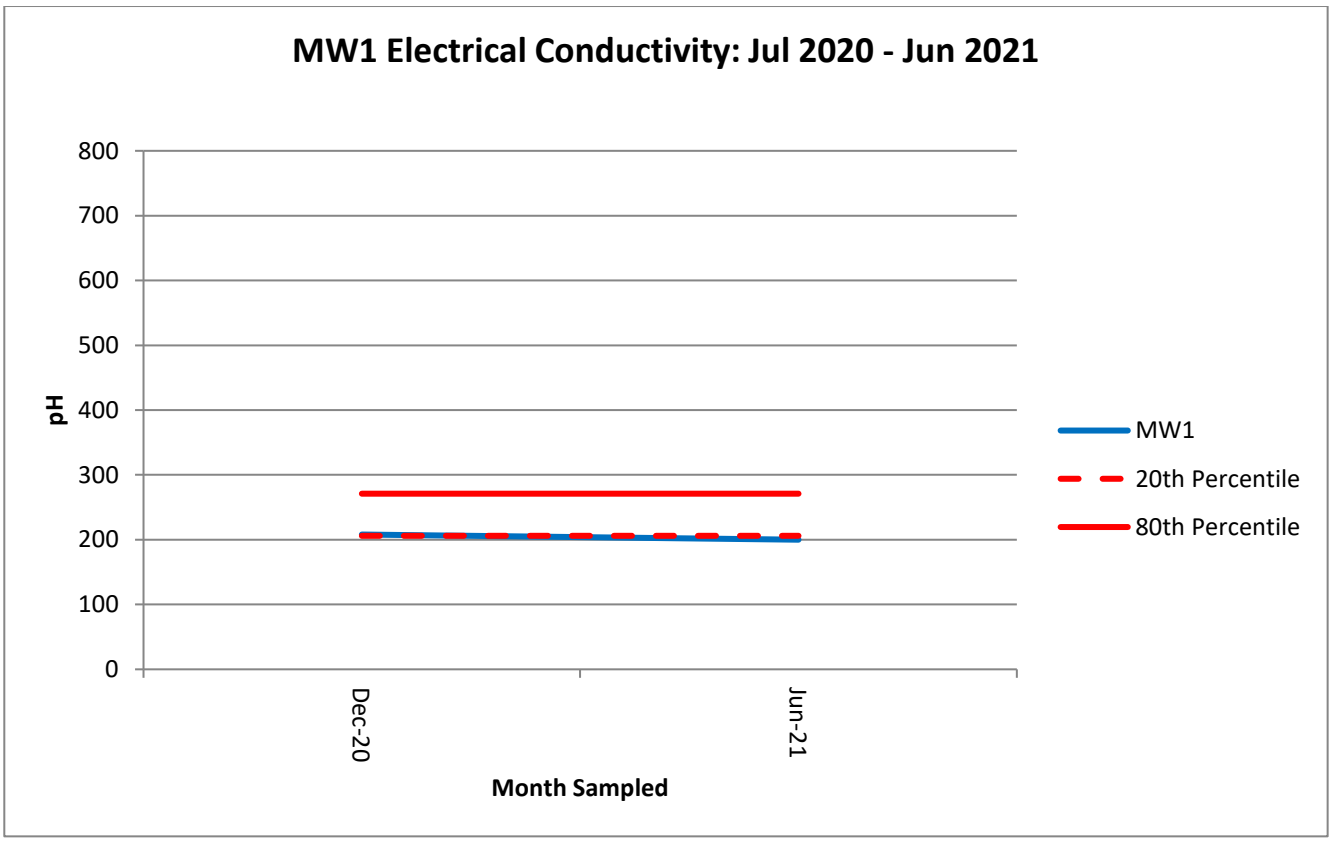


Chart 44: MW1 Electrical Conductivity Results July 2020 – June 2021.

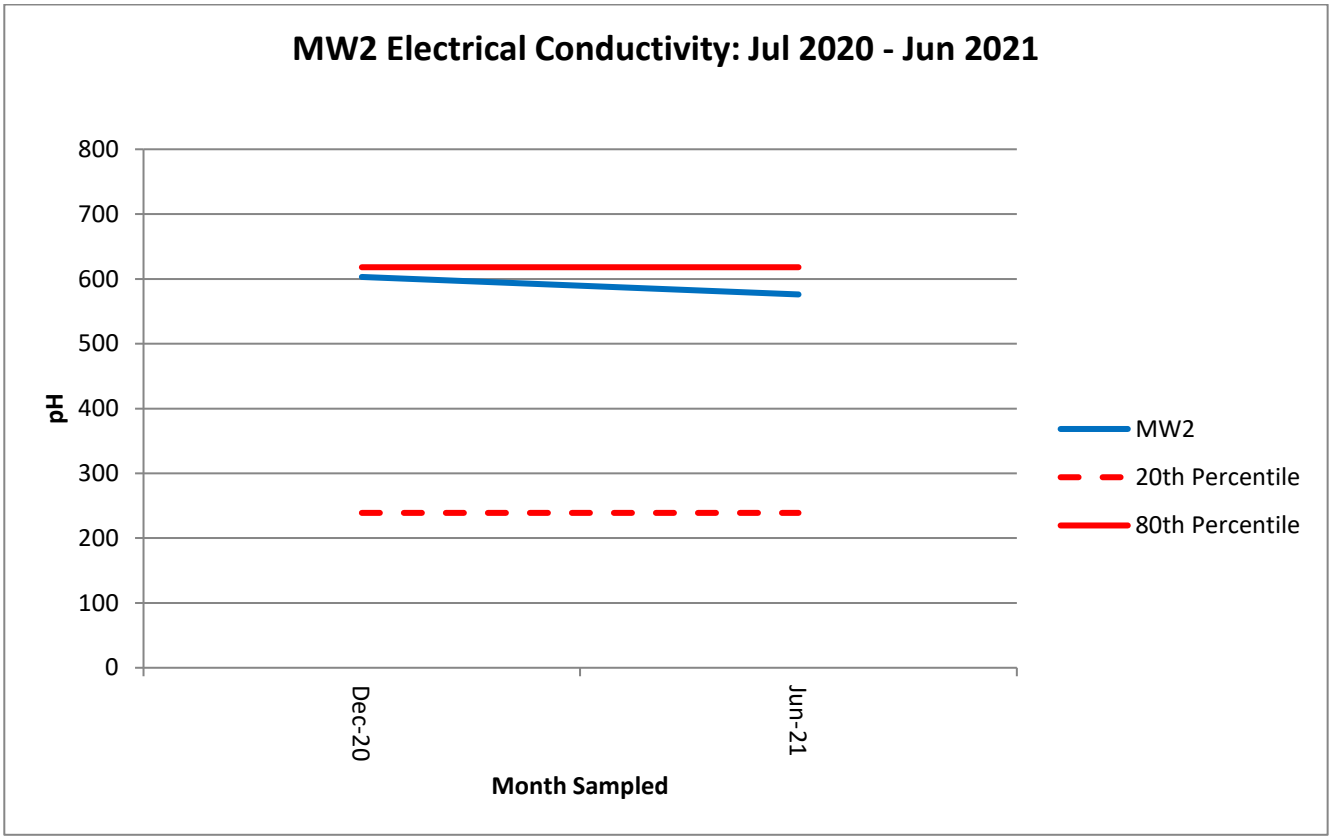


Chart 45: MW2 Electrical Conductivity Results July 2020 – June 2021.

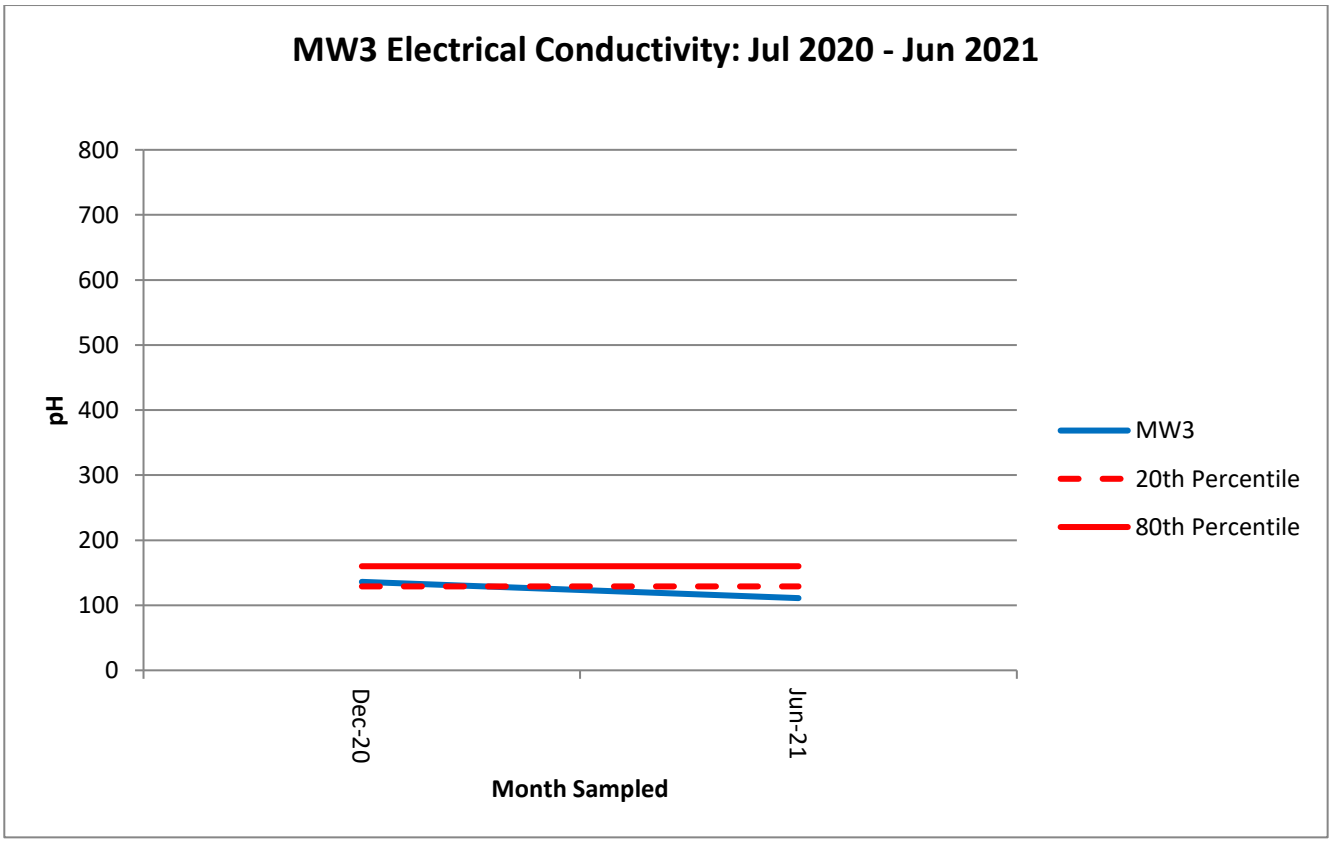


Chart 46: MW3 Electrical Conductivity Results July 2020 – June 2021.

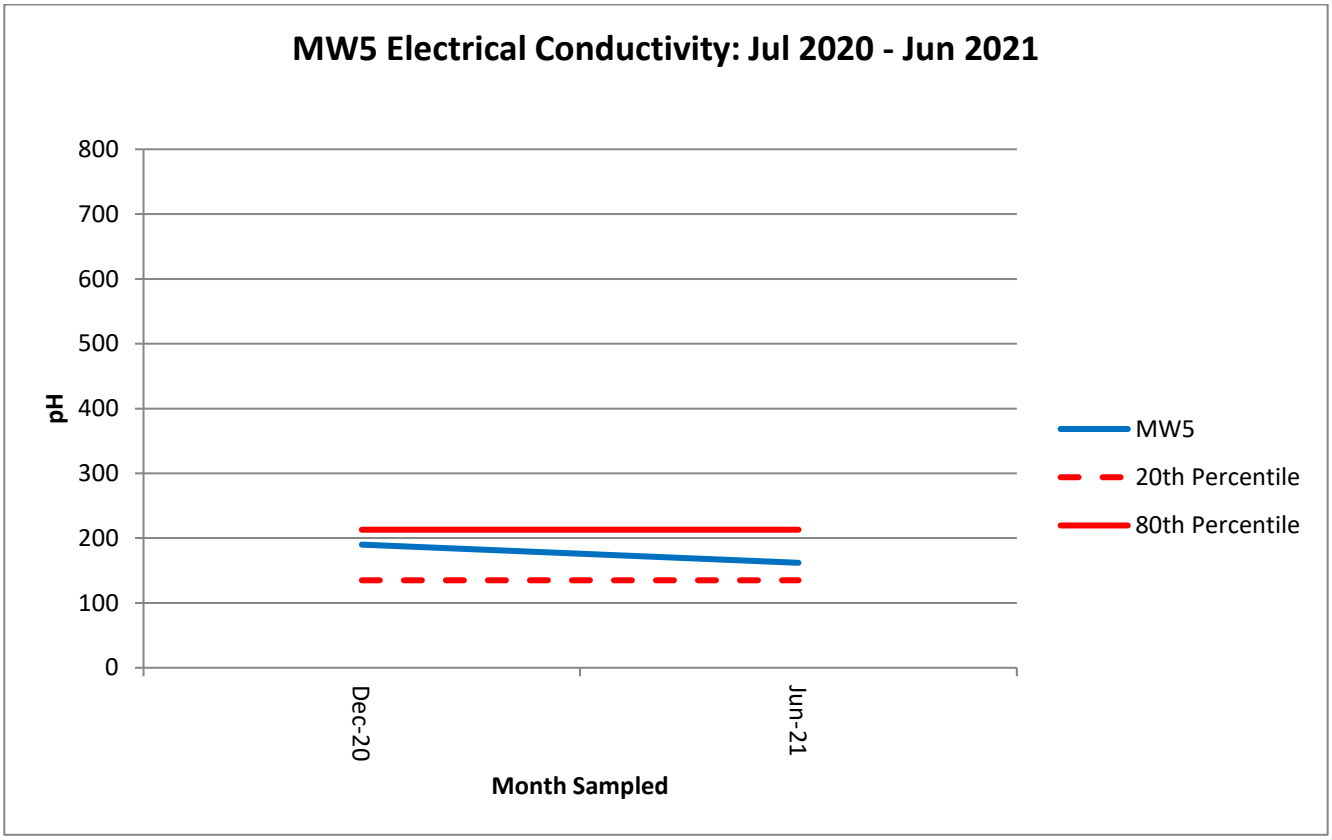


Chart 47: MW5 Electrical Conductivity Results July 2020 – June 2021.

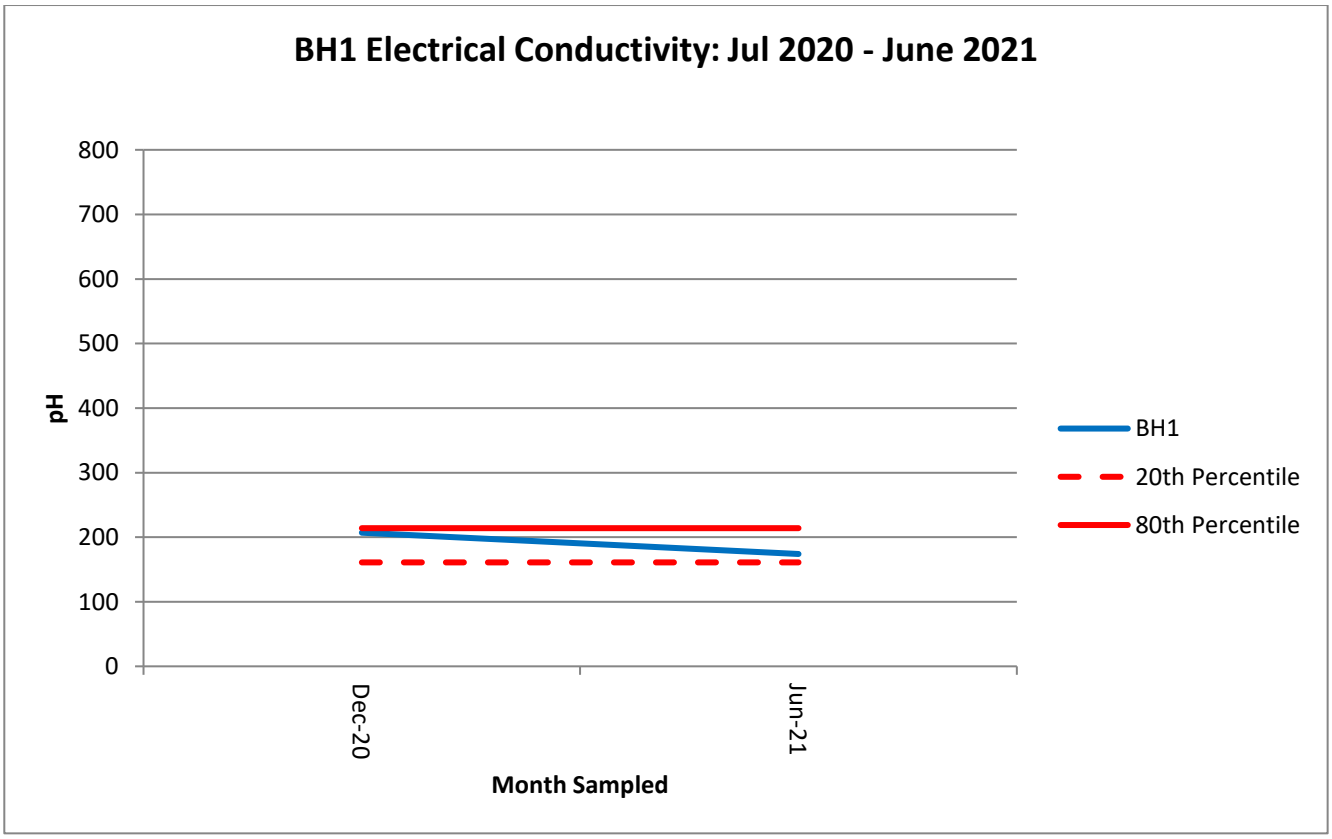


Chart 48: BH1 Electrical Conductivity Results July 2020 – June 2021.

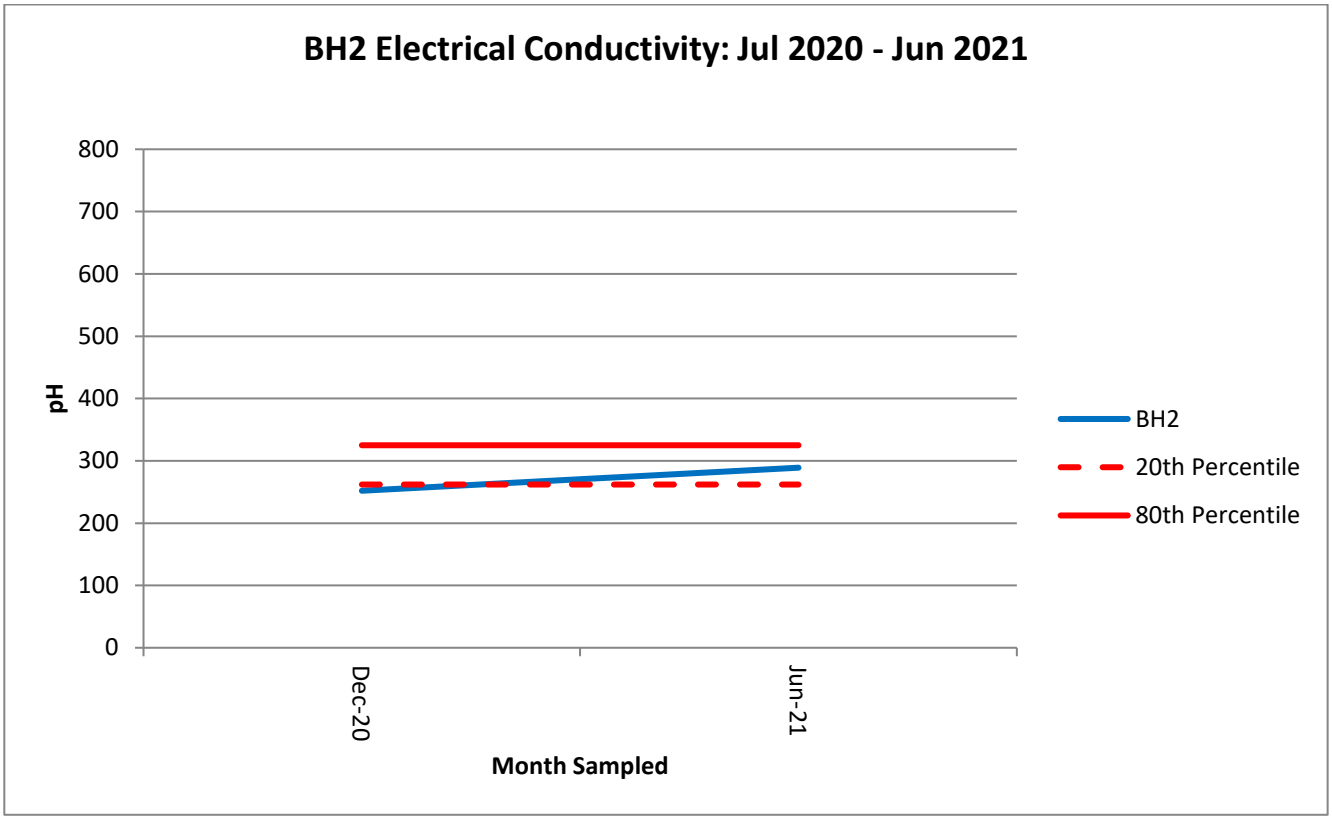


Chart 49: BH2 Electrical Conductivity Results July 2020 – June 2021.

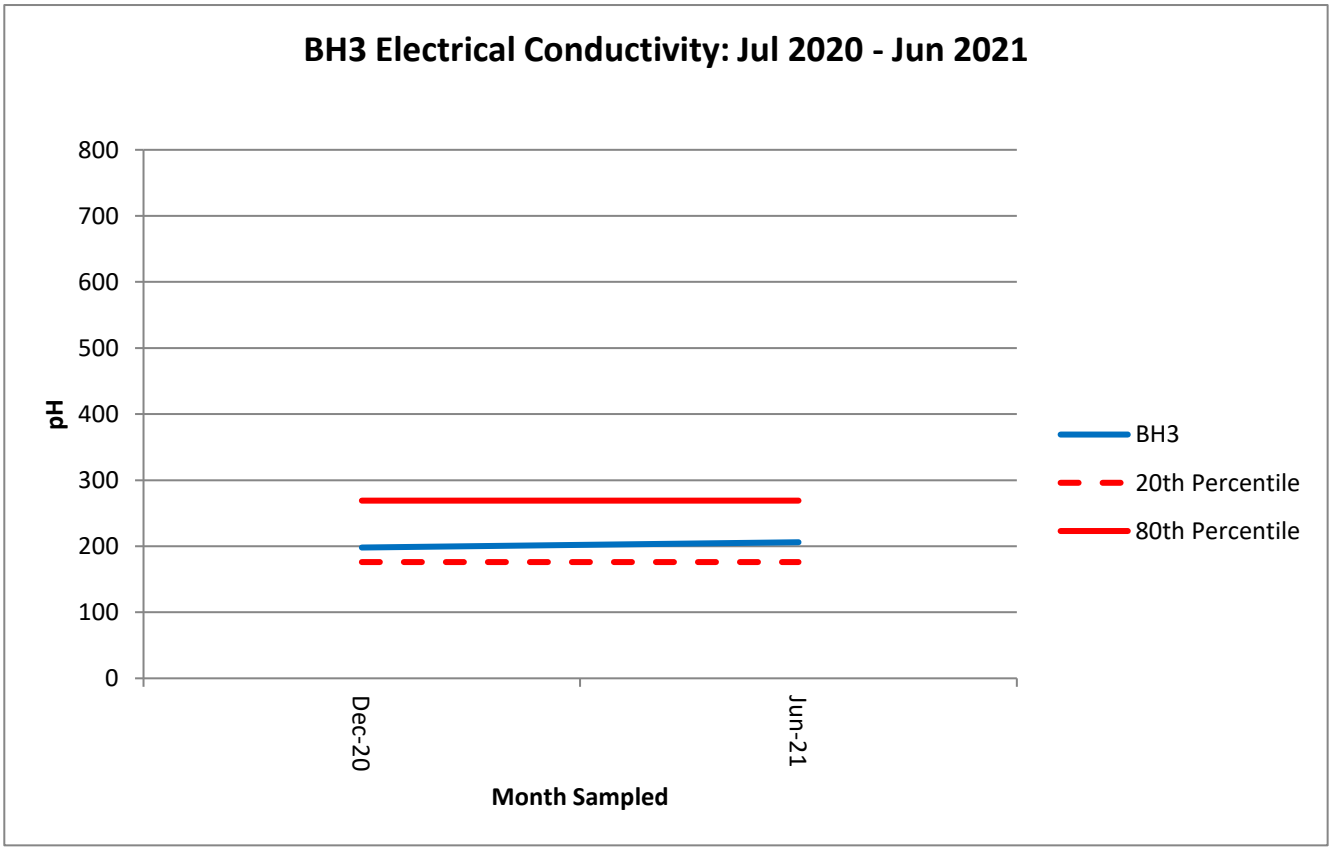


Chart 50: BH3 Electrical Conductivity Results July 2020 – June 2021.

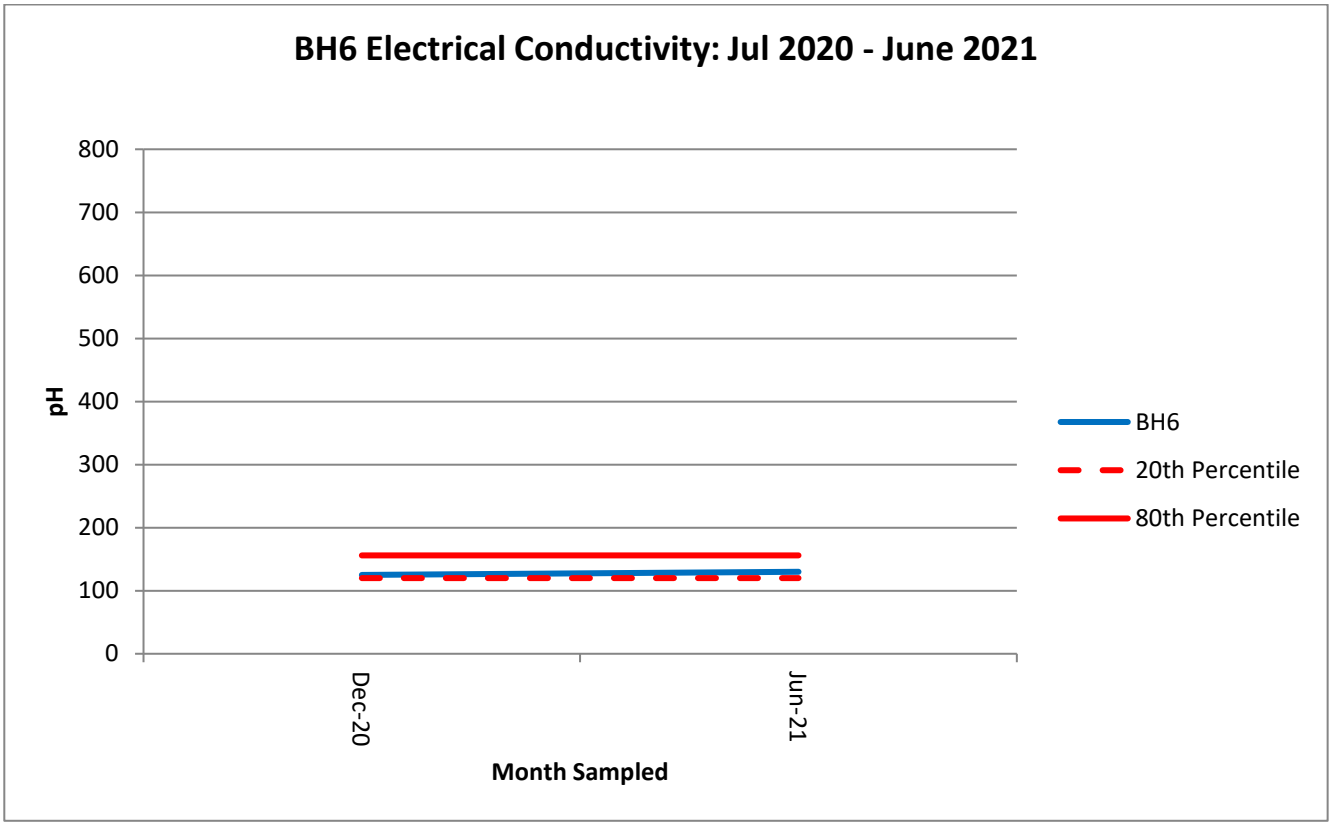


Chart 51: BH6 Electrical Conductivity Results July 2020 – June 2021.

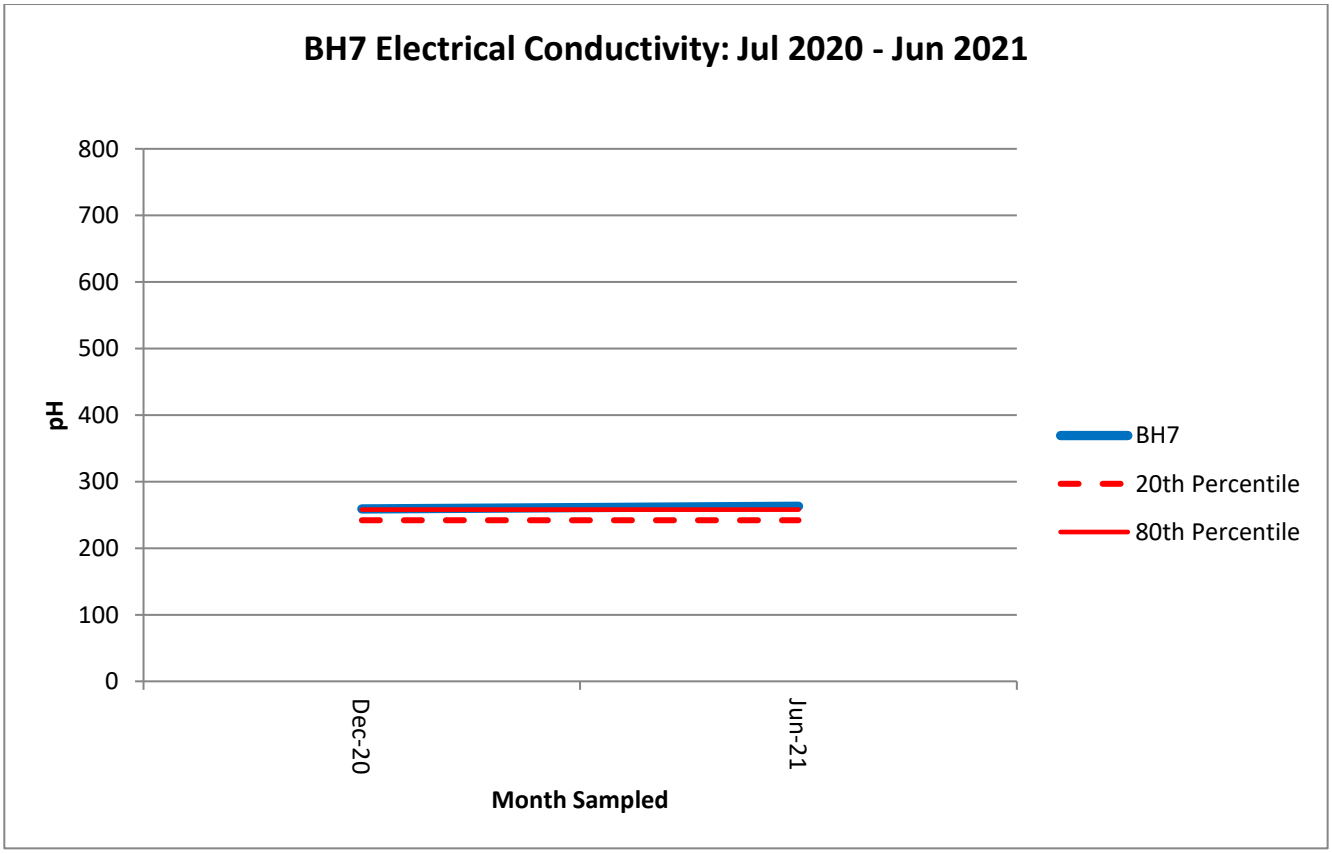


Chart 52: BH7 Electrical Conductivity Results July 2020 – June 2021.

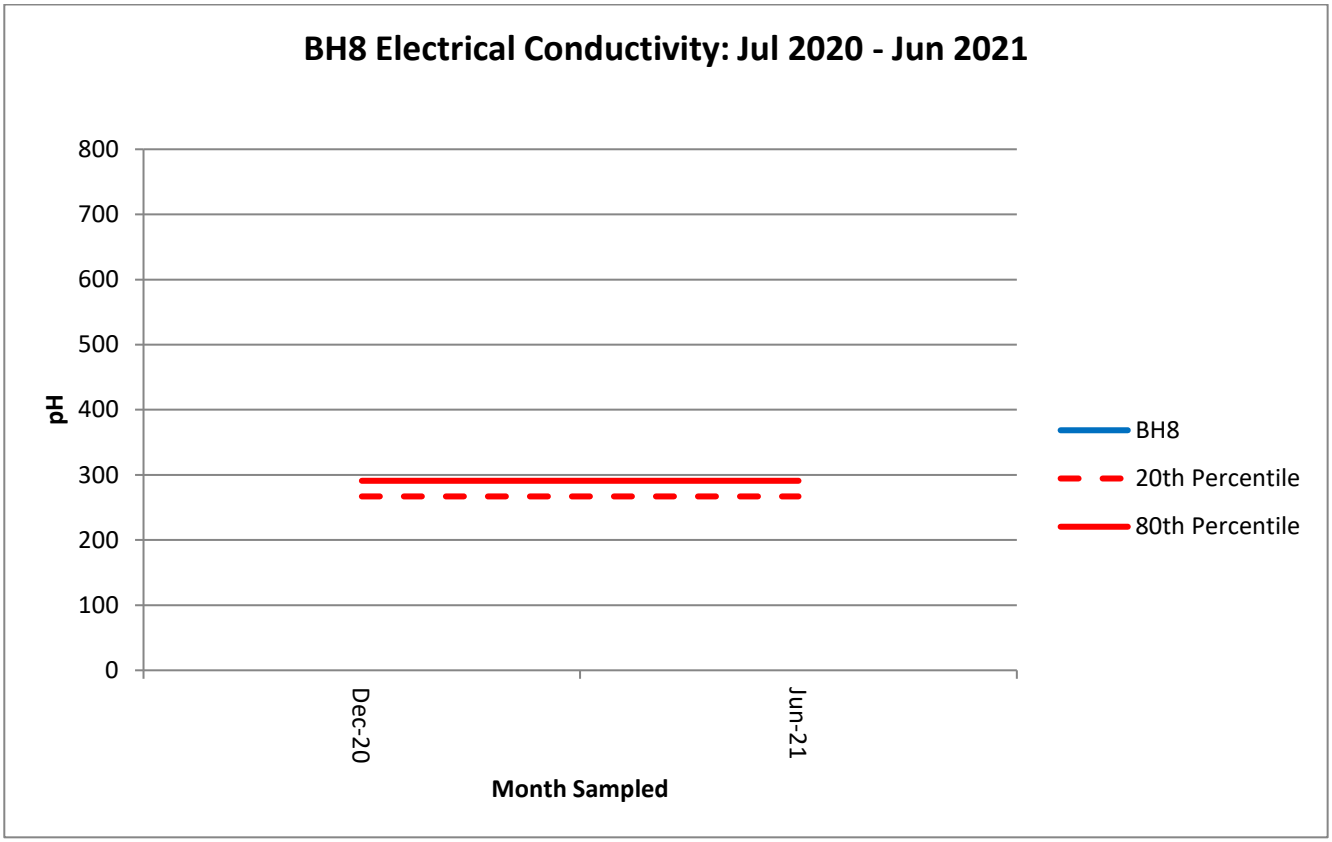


Chart 53: BH8 Electrical Conductivity Results July 2020 – June 2021.

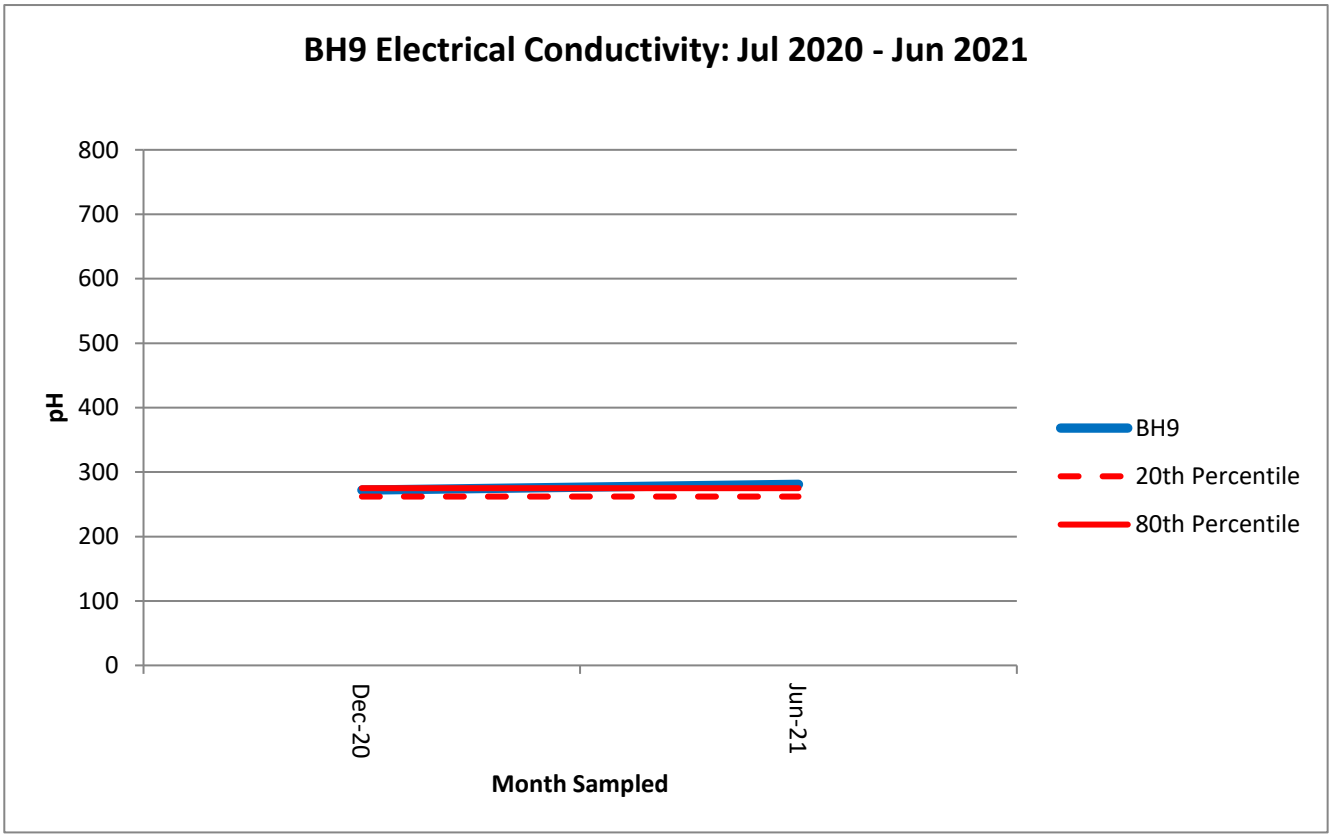


Chart 54: BH9 Electrical Conductivity Results July 2020 – June 2021.

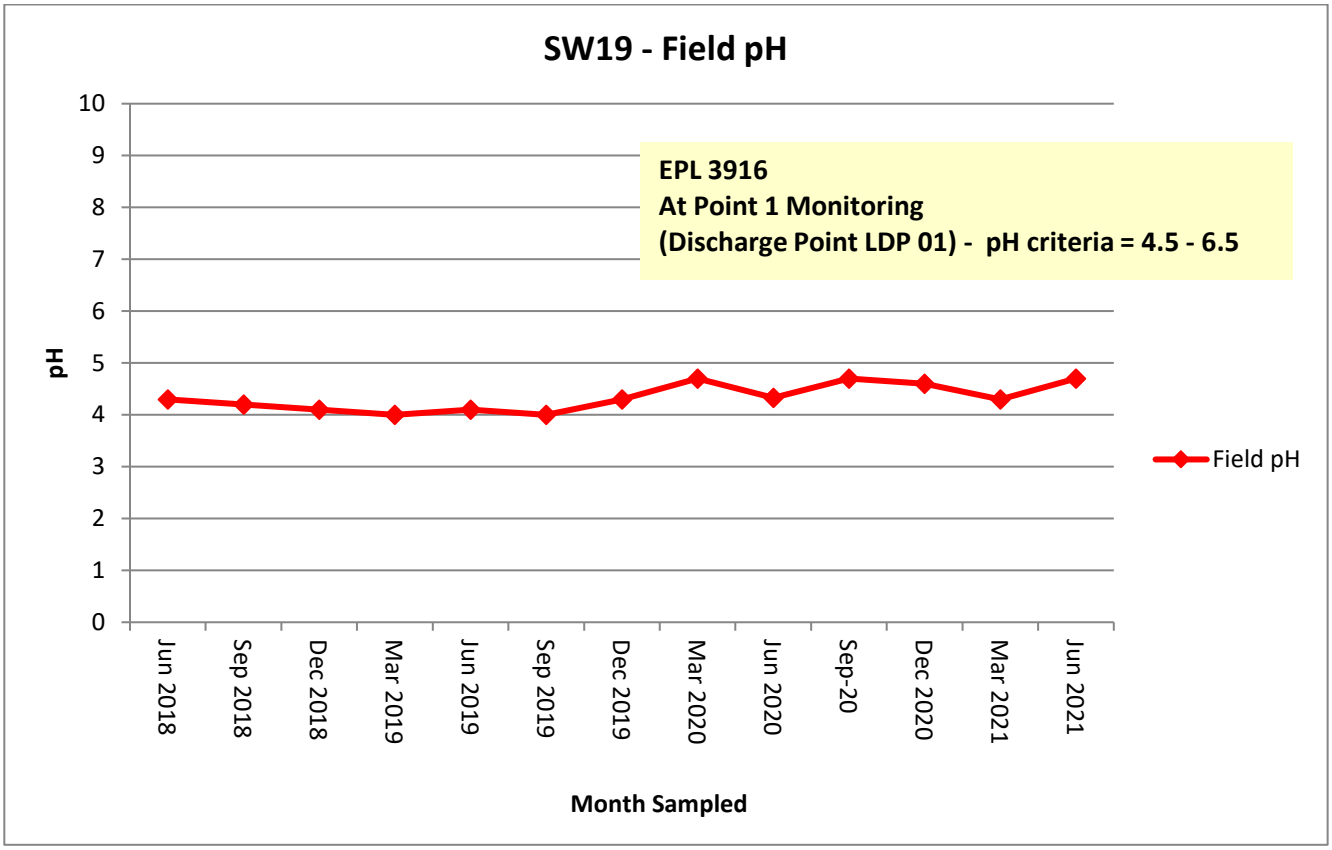


Chart 55: SW19 Field pH June 2018 – June 2021.

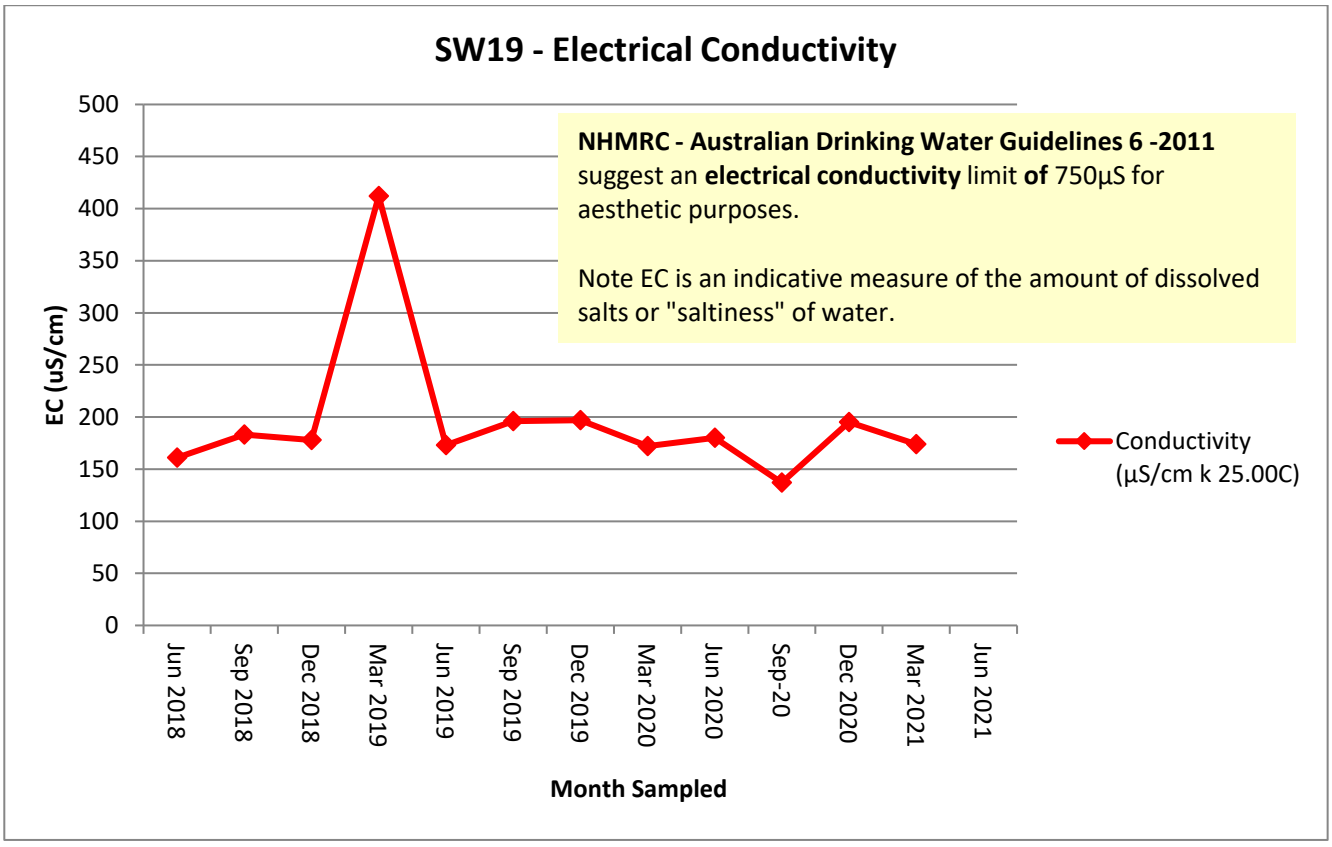


Chart 56: SW19 Electrical Conductivity June 2018 – June 2021.

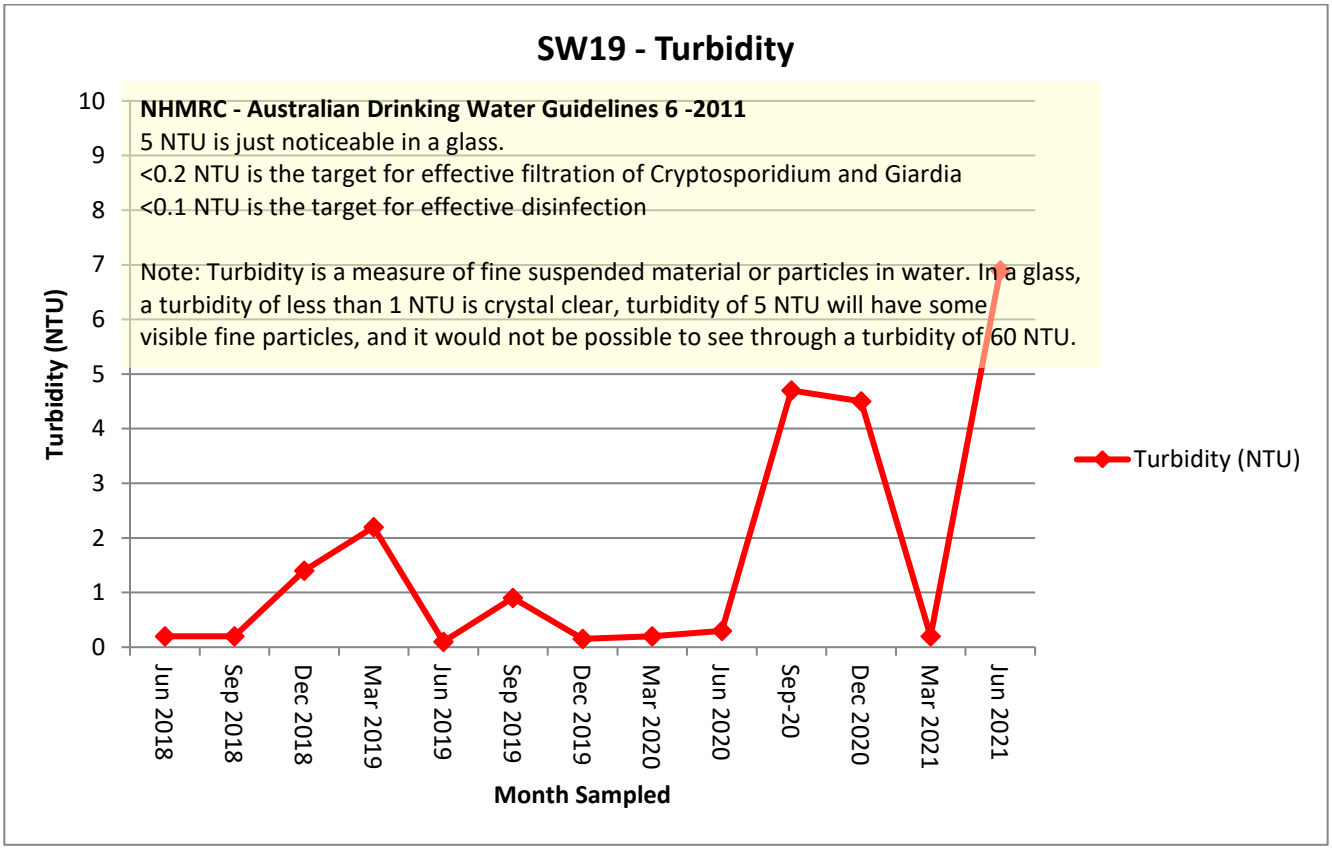


Chart 57: SW19 Turbidity June 2018 – June 2021.

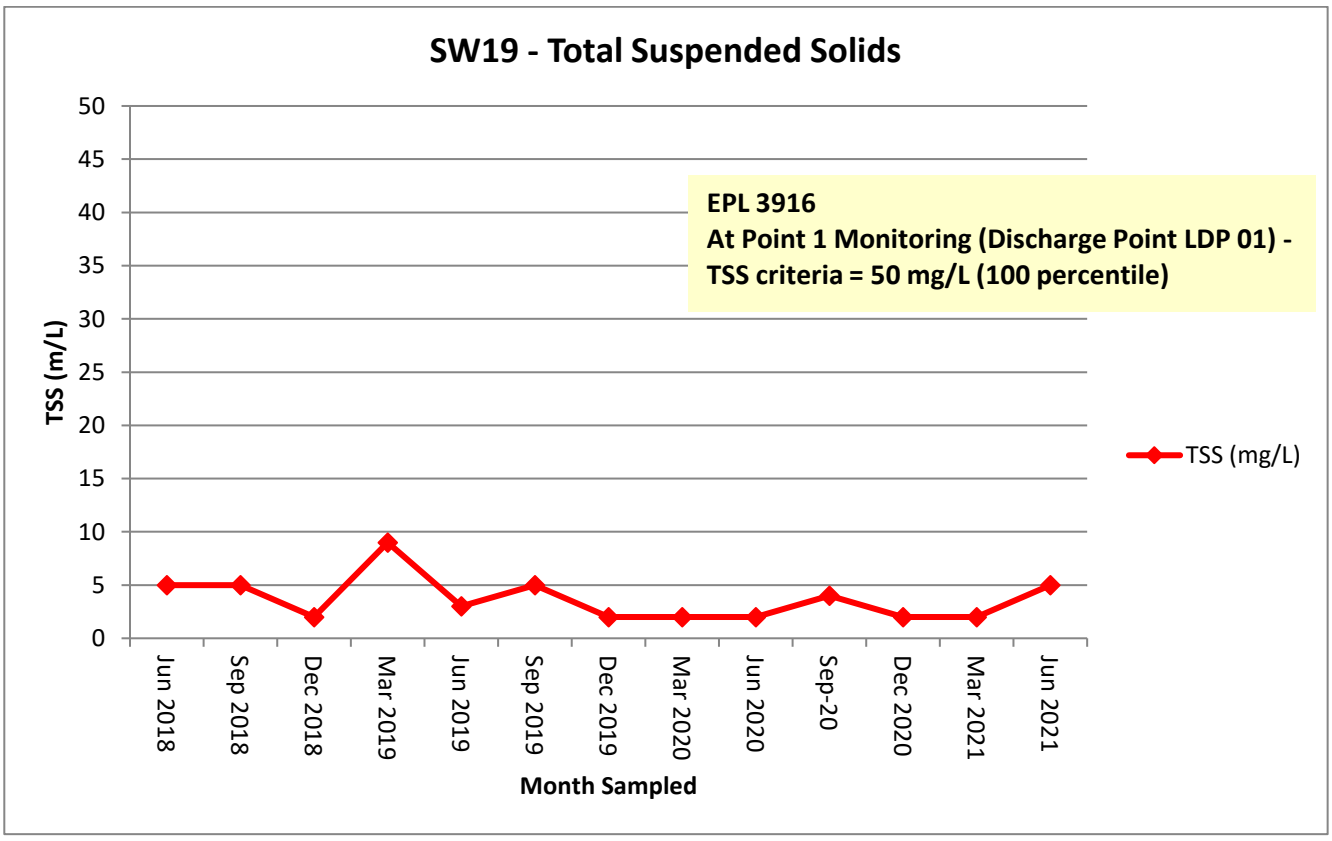


Chart 58: SW19 Total Suspended Solids June 2018 – June 2021.

Table 28: LDP01 laboratory results, relevant water criteria and compliance for discharge.

	pH			Total Suspended Solids (mg/L)			Turbidity (NTU)		
Sample Date	Laboratory Result	EPL Criteria	Criteria met	Laboratory Result	EPL Criteria	Criteria met	Laboratory Result	EPL Criteria	Criteria met
No discharge at LDP01 this reporting period									

6.4 Analyses

6.4.1 Groundwater Levels

Groundwater level results for bores which monitor localised perched groundwater aquifers (MW series and BH8) indicate relatively high fluctuations between water levels across the monitoring months. The majority of the measured groundwater levels in perched aquifer bores are below the 20th percentile which is the lower limit of the adopted trigger levels in the Soil and Water Management Plan. An investigation into the monitoring results indicate that these water level fluctuations are directly correlated to the amount of aquifer recharge of water through ground infiltration and percolation. Perched aquifers have been shown to be more responsive to surface water infiltration and percolation from rainfall events which have been evident since the commencement of the monitoring program. The 2020 – 2021 reporting period experienced wetter conditions than the previous year however groundwater levels in the perched aquifer boreholes are still likely to be recovery mode after an extensive period of drought from the previous monitoring years.

Water level results for boreholes which monitor the Sydney Basin Central Groundwater Source aquifer (BH1, BH2, BH3, BH6, BH7 and BH9) depict a strong trend across the monitoring months. The majority of the measured groundwater levels in SBCGS aquifer bores are below the 20th percentile which is the lower limit of the adopted trigger levels in the Soil and Water Management Plan. Groundwater level deviation from the 20th and 80th percentiles is consistent with those from the previous reporting period. It can be observed that there is a minor increasing trend in groundwater levels across the majority of the SBCGS boreholes.

6.4.2 Groundwater Quality

Greater fluctuations of pH values in groundwater were recorded during the 2010 to 2015 period. Relatively more stable pH values were recorded from 2015 to date, with the exception of BH2 which was struck by a vehicle late 2018. BH2 was rectified and groundwater quality monitoring recommenced in December 2019. Generally, pH values for MW1, MW2, MW3, MW5, BH2, BH3, BH6, BH7 and BH9 fall within the 20th and 80th percentile trigger values during the reporting period. pH values in BH1 were slightly higher than the 80th percentile value whilst pH values of BH6 were slightly lower than the 20th percentile value, a similar trend to the previous reporting period.

Electrical conductivity (EC) values in groundwater have been relatively stable from 2010 to the current reporting period, showing some fluctuations which were considered anomalies. Electrical conductivity in MW2 showed greater fluctuations between 2010 and 2015 and started to stabilise from 2016 onwards. Elevated electrical conductivity value

in MW5 was recorded in 2014 which then returned to stabilised values thereafter. Electrical conductivity values in BH2 showed greater fluctuations in 2015 to 2016 which subsequently stabilised thereafter. During this monitoring period, electrical conductivity values for the majority of boreholes fall within the 20th and 80th percentile trigger values. Electrical conductivity values in MW3 and BH2 were recorded slightly below the 20th percentile values whilst electrical conductivity in BH7 and BH9 returned values which were slightly higher than the 80th percentile.

In both instances, the variations in pH and electrical conductivity values were likely to be influenced by prolonged drought conditions and the wetter condition experienced during the monitoring period.

No water sample from BH8 was able to be obtained for analysis during the December 2020 and June 2021 sampling event, therefore water quality for this borehole could not be reported.

6.4.3 Assessment of Surface Water Quality and Discharge Event

SW19 represents the receiving water downstream of the discharge point (LDP01 which is Monitoring Point 1 of EPL 3916). Quarterly sampling and analysis of surface water quality at SW19 re-commenced in June 2018. pH values of water sampled from SW19 were relatively consistent, fluctuating between 4.0 – 4.7 and fall within the EPL 3916 pH criteria for LDP01. Electrical Conductivity (EC) values fluctuated between 137 and 195 µS/cm. EC at SW19 were well below the *NHMRC - Australian Drinking Water Guidelines 6 - 2011* which suggests an electrical conductivity limit of 750µS for aesthetic purposes. Turbidity values from SW19 varied between 0.2 and 6.9 NTU which according to the *NHMRC - Australian Drinking Water Guidelines 6 – 2* implies that water samples were mostly clear to some fine particles being visible. Total suspended solids (TSS) at SW19 varied between 2 – 5 mg/L which are significantly lower than the EPL 3916 TSS criteria of 50 mg/L.

No planned water discharge occurred at the licensed discharge point LDP01 (main water channel) during this reporting period.

The receiving surface water quality monitoring at SW19 was undertaken on a quarterly basis during this monitoring period in September 2020, December 2020, March 2021 and June 2021.

Table 29 presents the baseline surface water (SW19) quality and trigger values contained in the ***Soil and Water Management Plan (v5, November 2020)*** (SWMP). The trigger values adopted in the SWMP are as follow:

- pH: 20th and 80th percentile
- TSS: 80th percentile
- Turbidity: 80th percentile

Table 30 presents the surface water (SW19) quality results yielded during this monitoring period.

Table 29: Baseline Surface Water (SW19) Quality and Trigger Values (June 2018 to June 2020).

Parameter	Minimum	20th Percentile	50th Percentile	80th Percentile	Maximum
pH	4.0	4.1	4.2	4.3	4.7
TSS (mg/L)	2.0	2.0	3.0	5.0	9.0
Turbidity (NTU)	0.1	0.2	0.2	1.1	2.2

Table 30: Surface Water (SW19) Quality Results 2020 – 2021.

Parameter	Sep 2020	Dec 2020	Mar 2021	Jun 2021
pH	4.7	4.6	4.3	4.7
TSS (mg/L)	4.0	2.0	2.0	5.0
Turbidity (NTU)	4.7	4.5	0.2	6.9
Flow Rate (Field Observation)	Medium flow	Low flow	Low flow	Medium flow
SW19 quality results fall within the Trigger Values (SWMP, V5, Nov 2020)	No (pH and Turbidity above 80th percentile)	No (pH and Turbidity above 80th percentile)	Yes	No (pH and Turbidity above 80th percentile)

The surface water (SW19) quality results contained in Table 30 indicate that with higher rainfall and flows within the creek some of the parameters fall outside the trigger value thresholds of Table 29.

6.4.4 Comparison of Surface Water Discharge Volume and Quality with Historical Data

The long-term discharge volumes and analysed water quality at the EPA licensed discharge point LDP01 are shown in Table 31. A total of 1.50 megalitres of water have been discharged during the discharge events since the 2003 – 2004 monitoring period to date. No water discharge at the license discharge point LDP01 occurred during this reporting period.

Condition M2.3 of EPL lists the limits of water quality criteria to be met for water discharge which are:

- pH: 4.5 – 6.5
- Total suspended solids: 50 mg/L

Historically, laboratory results indicate that all water quality suites have met the EPL discharge criteria since the commencement of monitoring, except for one discharge event in the 2014 – 2015 monitoring period where the total suspended solids were slightly elevated and exceeded the EPL criteria.

Table 31: Long Term Discharged Water Volume at LDP01 (EPL licensed discharged point)

Annual Review Monitoring Period	Discharge Volume (Megalitre)	pH	Total Suspended Solid (mg/L)	Turbidity (NTU)	EPL Discharge Criteria Met
2003 – 2004	0.062 *1 0.034 *2	4.9 *1 5.0 *2	16 *1 31 *2	21 *1 33 *2	Yes *1 Yes *2
2004 – 2005	0.374 *1 0.156 *2	5.9 *1 6.3 *2	33 *1 22 *2	60 *1 6.3 *2	Yes *1 Yes *2
2005 – 2006	0	-	-	-	-
2006 – 2007	0	-	-	-	-
2007 – 2008	0	-	-	-	-
2008 – 2009	0	-	-	-	-
2009 – 2010	0	-	-	-	-
2010 – 2011	0	-	-	-	-
2011 – 2012	0	-	-	-	-
2012 – 2013	0	-	-	-	-
2013 – 2014	0	-	-	-	-
2014 – 2015	Not measured *1 Not measured *2	4.7 *1 5.5 *2	64 *1 32 *2	40 *1 80 *2	No *1 Yes *2
2015 – 2016	0	-	-	-	-
2016 – 2017	0	-	-	-	-
2017 – 2018	0	-	-	-	-
2018 – 2019	0	-	-	-	-
2019 – 2020	0.350 *1 0.520 *2 0.005 *3	5.79 *1 4.60 *2 no sample *3	18 *1 2 *2 no sample *3	24.1 *1 4.2 *2 no sample *3	Yes *1 Yes *2 No *3
2020 – 2021	0	-	-	-	-
TOTAL Volume Discharged (Megalitre)	**1.500**				

Note: *1 *denotes to discharge event number 1 within the monitoring period*
*2 *denotes to discharge event number 2 within the monitoring period*
*3 *denotes to discharge event number 3 within the monitoring period*

6.5 Maximum Extraction Depth Map

The Maximum Extraction Depth Map (MEDM) is based on the wet weather groundwater elevation and is determined by the quarry groundwater monitoring network.

An Independent Environmental Audit (IEA) was completed, and the report submitted in January 2020. Condition 23 of Schedule 2 of DA 250-09-01 states that a review and update of the MEDM for the Quarry is to be undertaken within 3 months of the completion of the IEA, to the satisfaction of the Secretary. A review of the MEDP was undertaken by Golder Associates in March 2020. The reviewed document was submitted to the DPIE on 3 April 2020 for review and approval. No changes have been proposed in the April 2020 version of the MEDM. No changes have been proposed between April 2020 and June 2021.

The next revision and update of the MEDM will be undertaken within 3 months of the next IEA which is scheduled to occur late 2022.

6.6 Water Access License Usage

The Annual Returns for Water Access Licenses (WALs) 24325, 24341 and 43270 for the 2020 – 2021 reporting period were submitted to WaterNSW on 20th July 2021. The total water usage for each WAL is listed in Table 32 below.

Table 32: Water usage for Water Access Licences

Water Access License Number	Annual Water Usage (Megalitres)
WAL 24325	0
WAL 24341	0
WAL 43270	0

6.7 Chages to Environmental Procedures

Current groundwater management measures are considered adequate. No changes to environmental procedures are proposed.

Monitoring of the extraction limit will continue in order to ensure compliance. The Maximum Extraction Map for Old Northern Road quarry will require review following the next Independent Environmental Audit scheduled in late 2022.

Continue to monitor groundwater levels and quality, together with observations of any environmental or land use changes.

Any planned surface water discharge at LDP01 main water channel (Monitoring Point 1 of EPL 3916) will require grab samples prior to discharge for laboratory analysis to ensure pH, TSS and turbidity are within the specified EPL concentration limits. Dixon Sand staff to implement the Permit to Discharge procedure which outlines the steps required leading up to the allowable water discharge.

Quarterly sampling of surface water at SW19 to continue as normal.

7. Ecological Monitoring and Rehabilitation

7.1 Vegetation Clearing

No vegetation clearing occurred during this reporting period.

Previous vegetation clearing was undertaken in accordance with the pre-clearing survey and multi-stage habitat tree clearing protocols implemented by the Quarry. Appropriate briefings were provided to the relevant staff prior to the commencement of vegetation clearing.

7.2 Bush Regeneration and Weed Management

Rehabilitation and weed management at Old Northern Road quarry were undertaken by a bush regeneration contractor Bush-It Pty Ltd with multiple visits each month throughout the reporting period.

Approximately 492.5 hours was spent on bush regeneration works at Old Northern Road Quarry, equating to approximately 69% of the time spent between Old Northern Road Quarry and Haerses Road Quarry scope of works.

Bush regeneration and weed management are carried at the following locations:

- Vegetated areas on Lots 1 and 2 excluding areas in the extraction pit,
- Native Vegetation Corridor on 29,
- Southern border of extraction pit on Lot 196,
- Front embankment along the quarry entrance, and
- Biodiversity Offset Area located at Haerses Road (Lots 176 and 177 DP 752039).

Bush regeneration works involved mechanical and chemical methodologies.

Figures 3 and 4 show the locations where bush regeneration and weed management works have been undertaken at the Old Northern Road Quarry and Biodiversity Offset Area (located at Haerses Road) during this reporting period.

The Annual Bush Regeneration Report provided by the contractor for the 2020 – 2021 reporting period is attached as Appendix G.

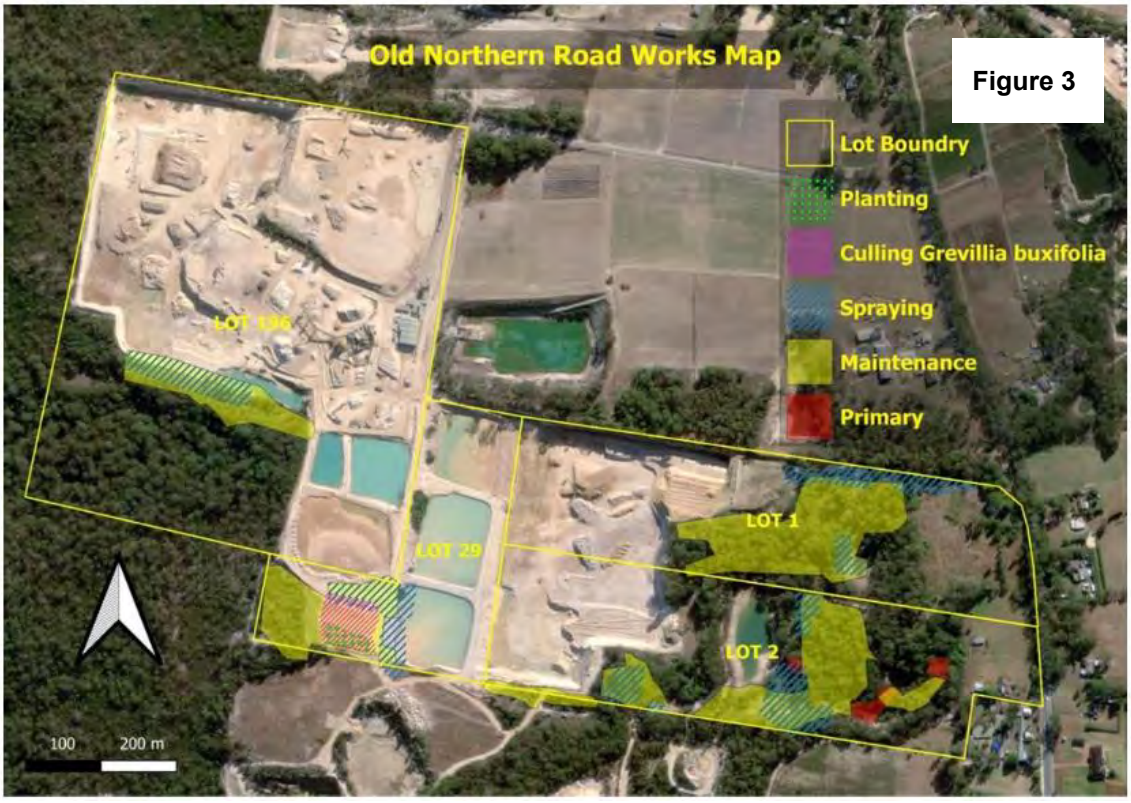


Figure 3: Bush regeneration and weed management works area at Old Northern Road Quarry (source: BushIT 2021).

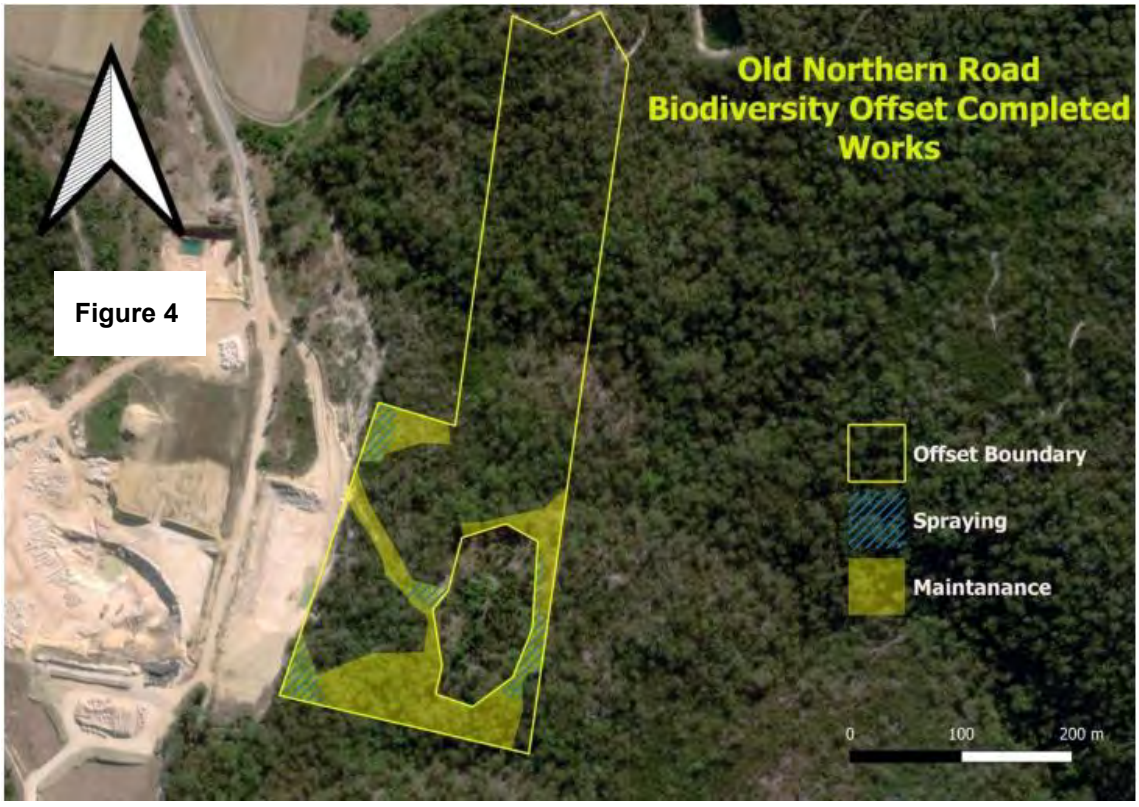


Figure 4: Bush regeneration and weed management works are at Haerses Road Biodiversity Offset Area (source: BushIT 2021).

7.3 Biodiversity and Rehabilitation

Dixon Sand engaged South East Environmental to undertake the annual biodiversity and rehabilitation monitoring and reporting for Old Northern Road Quarry. Progress assessments were made against the commitments in Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (BRMP). The Biodiversity and Rehabilitation Management Report (South East Environmental, 2021) aimed to:

- Identify native flora and fauna species, populations and ecological communities known to or likely to occur within the Native Vegetation Corridor (NVC) and Haerses Road Biodiversity Offset Area (HRBOA),
- describe the native vegetation and habitats within the NVC and HRBOA,
- describe the current condition of the threatened flora and its habitat found outside of the NVC at Old Northern Road,
- determine the legislative and conservation significance of species, populations and ecological communities known or likely to occur within the NVC and HRBOA with reference to the Commonwealth EPBC Act 1999 and the NSW BC Act 2016,
- recommend appropriate biodiversity and environmental management measures that should be implemented to reach criteria for monitoring success set by the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018), and
- provide an independent monitoring report for inclusion as part of the external reporting for the quarry Annual Review.

Field surveys were carried out over several days in July 2021 throughout the established monitoring sites across the quarry. Specific survey methodologies were adopted including the 20m x 50m quadrats, 2m x 20m subplots, 1m x 1m line plots and random meandering. Fauna survey methods included general searches with direct observation of species present, scats, early morning dedicated bird surveys, and utilisation of unbaled motion detection infra-red digital camera for 16 nights and Anabat recording device for 18 nights.

It was noted that the flora survey was conducted over a short timeframe during winter and therefore some plant species may have been undetected and not identified due to their dormancy or lack of flower status. The study was limited by the timing and frequency of survey.

Sections 7.3.1 to 7.3.10 describe the findings at each nominated rehabilitation and monitoring area, assessment against completion criteria, together with discussion and recommendations. The full Biodiversity and Rehabilitation Management Report (South East Environmental, 2021) is contained in Appendix H.

7.3.1 Native Vegetation Corridor

The Native Vegetation Corridor (NVC) comprised of a minimum area of 6.83 hectares, extending from the south-western corner of Lot 29 and extending along the southern boundary of Lot 2 to the area located between the 250m buffer and the Maroota Public School.

Five out of nine vegetation monitoring sites are located within the NVC.

The location of the NVC and vegetation monitoring sites are shown in Figure 5.

Rehabilitation of native vegetation in the NVC commenced in late 2017 on the south-western boundary of Lot 29, comprising an area of approximately 0.8 hectares. Parts of the current NVC are utilised as haul road, sediment ponds and active extraction area. The remaining area are existing areas containing native vegetation and disturbed areas which are remnants of orchard plantation, grazing land and farm dams.

Rehabilitation Area – Planted

The planted area in the NVC is approximately 0.4 hectares in size. One vegetation monitoring site as specified by the BRMP is located in this area. Native nursery tube stocks were planted in this location. Two of the species, *Melaleuca deanei* (vulnerable) and *Darwinia fascicularis* ssp*. oligantha* (endangered population) under the *Biodiversity Conservation Act* 2016, were propagated from onsite specimens, grown in commercial nurseries and replanted in the NVC.

A total of 47 native species have been planted in this area, including the abovementioned propagated threatened species. The ecological survey during this monitoring period identified an additional 44 native species which have emerged from seed bank storage from the sub-soil, including the endangered species *Acacia byoneana* and *Tetratheca glandulosa*. This is an increase of 2 species since last monitoring year which appears to have emerged from seed bank stored in the soil due to ideal growing conditions.

There were 15 live specimens of *Melaleuca deanei* and 17 *Darwinia fascicularis* ssp*. oligantha*, 2 *Acacia byoneana* and 5 *Tetratheca glandulosa* located this reporting period. The slight reduction in threatened species specimens may be due to the density of regrowth over the past year. No weed was observed in this area.

Rehabilitation Area – Translocated

This area involved direct translation of material from Lots 1 and 2 vegetation clearing. Recruitment from seed bank storage were observed to be ample. All age classes ranging from small seedlings to adult shrubs were observed from small seedlings to adult shrubs which were in flower during the survey. Shrubs and ground cover species were reasonably abundant throughout the area. The canopy stratum is yet to fully establish however, *Eucalyptus sp*., *Corymbia sp*. and *Angophora hispada* recruits were observed.

Translocated *Darwinia fascicularis* ssp*. oligantha* is abundant particularly on the western section of the area. One single translocated *Tetratheca glandulosa* were observed to be in a healthy state with flowers present during the survey. Another *Tetratheca glandulosa* specimen was located which has grown from seed bank within the soil.

Two *Melaleuca deanei* which were planted in 2017 are still present and observed to be in a healthy state. A further 23 *M. deanei* individuals have been planted within this area during the reporting period. All plants appear to be doing well with some showing signs of active growth.

Rehabilitation Area – Soil Seed Bank

Ample natural recruitment of native species was observed in this area, including *Darwinia fascicularis* ssp*. oligantha* recruitment. Ground cover and shrub species are present throughout. The canopy stratum is yet to fully establish however juvenile *Eucalyptus sp*. were observed. *Acacia suaveolens* dominates the recovering shrub layer with *Grevillea buxifolia* and *Banksia ericifolia* being widespread.

Altogether 27 *Darwinia fascicularis* ssp*. oligantha* have been identified and are scattered throughout the site, some observed to have new recruits. One single *Melaleuca deanei* was located in this area and observed to be in a healthy state. The location of other undetected threatened flora specimen is likely to be due to the high density of shrub regrowth hampering the efforts to locate other individuals *M. deanei*.

Vegetation Monitoring within NVC

Out of the nine vegetation monitoring sites across the whole Old Northern Road Quarry site, five vegetation monitoring sites are located within the NVC including one site within the planted rehabilitation area previously discussed. From the remaining four sites, two sites could be safely accessed for monitoring. The two remaining sites are currently in active quarry extraction area.

The overall health of the vegetation and biodiversity within the NVC is moderate. Historic disturbance was observed in this area and likely to be due to livestock grazing and timber removal. Recent average rainfall in the local area has assisted in the recovery of vegetation from previous drought conditions throughout 2018 and 2019 across all affected stratums with ground cover species showing good signs of recovery.

The remaining areas throughout the NVC are impacted by the presence of *Lantana camara*. An effort to remove and control has begun in earnest however due to the distribution and density, long term management is required to completely remove the species across the entire site.

Vegetation Monitoring outside NVC

Four vegetation monitoring sites are located outside the NVC. Access to two of the monitoring sites are located in the current extraction areas and therefore cannot be accessed. Access to one other monitoring site was restricted by the presence of *Lantana camara*.

The first accessible survey site is located outside the NVC within the 250m buffer to the Maroota Public School with vegetation determined to be *Smooth barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney* Basin Bioregion. This area was subjected to historic disturbance, most likely from timber harvesting. Survey indicated there is abundance *Eucalyptus piperita* regenerating within the survey quadrat, all being around the same age which indicates that the area had been previously cleared. Diversity within the survey site was categorised as reasonable and biodiversity values moderate. This survey site will not be subjected to future vegetation clearing for the quarry and therefore presents a good opportunity to monitor the effects of sand extraction in nearby retained vegetation.

The additional survey site is also classified as *Smooth barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney.* This survey location is located just within the 250m buffer to the Maroota Public School and will not be subjected to future vegetation clearing. Vegetation within this survey plot appears to have had very little disturbance and contains no exotic weeds. This survey location will also provide good baseline data for future reference for rehabilitation.

Lantana camara have some impacts on the remaining area outside the NVC. The third survey quadrat could not be accessed due to this. Removal and control of the species have commenced within this section however more efforts are required as progress is slow and favourable conditions for weed growth have affected weed management progress.

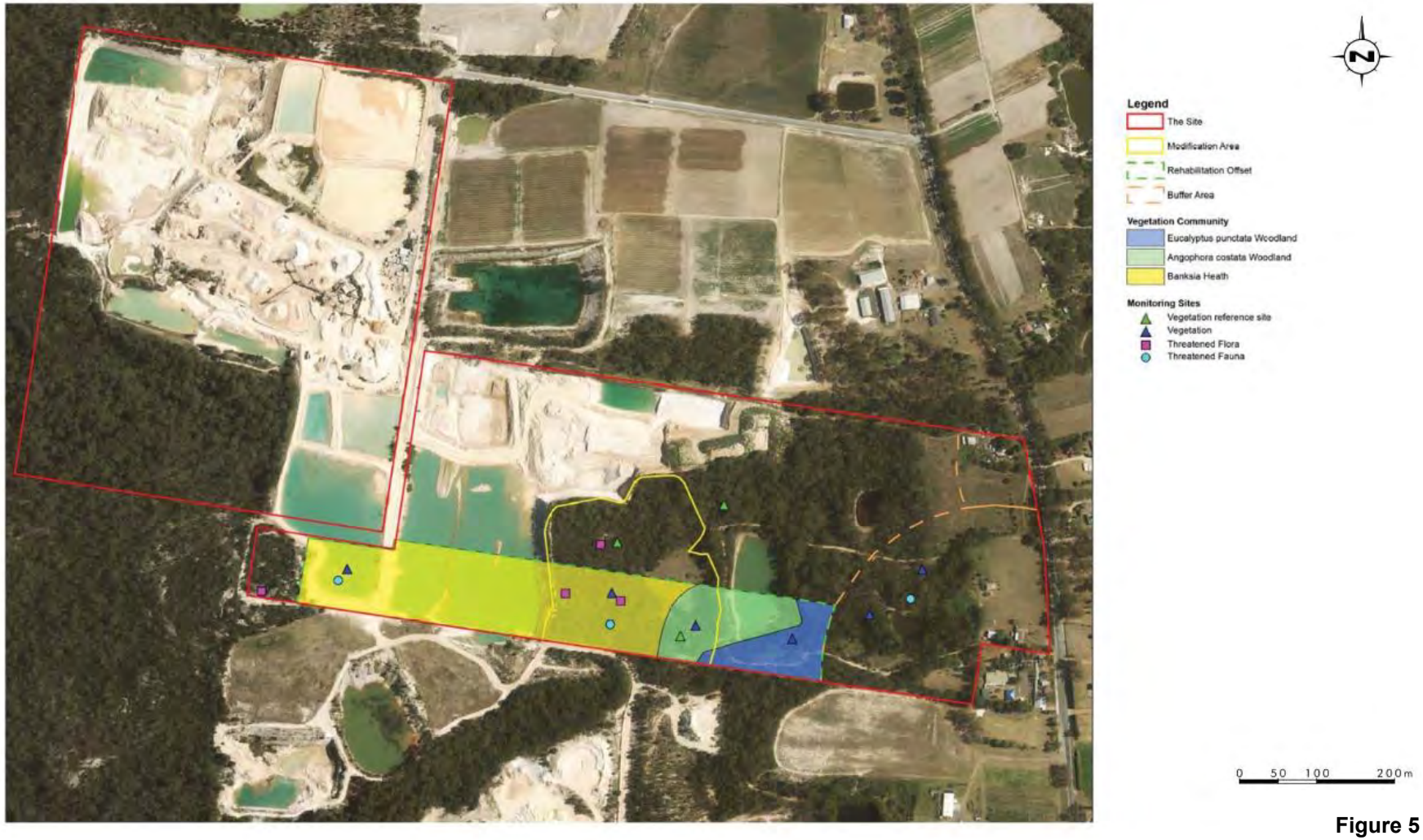


Figure 5

Location of Ecological Monitoring Sites
Old Northern Road Quarry

Image Source: Cumberland Ecology (2015)

File Name (A4): R06/4209_020.dgn
20180220 17.30

umwelt



Figure 6

Location of Ecosystem Monitoring Sites
Haerses Road Biodiversity Offset Area

Image Source: Cumberland Ecology (2015)

File Name (A4): R06/4209_021.dgn
20180220 17.10

7.3.2 Haerses Road Biodiversity Offset Area

The Haerses Road Biodiversity Offset Area (HRBOA) has a minimum area of 8.70 hectares and is located east of Stage 2 extraction at the Haerses Road quarry. Five vegetation monitoring sites are located within the HRBOA. The HRBOA and locations of the monitoring sites are depicted in Figure 6.

Overall, there has been an increase in foliage cover and structure cover in most stratums at the majority of the monitoring sites. Grass and groundcover species appear to have improved in density following recent average rainfall. An abundant number of *Darwinia biflora* specimens were recorded in Vegetation Monitoring Plot 2. Extensive Long-nosed Bandicoot digs were noted in an area close to Quadrat 1. Bird presence and density has remained consistent from the last survey, likely due to favourable weather conditions.

7.3.3 Threatened Flora Monitoring

Four threatened flora species are being monitored at the Old Northern Road quarry.

Kunzea rupestris* and *Darwinia fascicularis* ssp. *oligantha

The far western area of Lot 29 contains two rock platforms (eastern and western) occupied by *Kunzea rupestris* and *Darwinia fascicularis* ssp. *oligantha.* The Eastern rock platform contains four individual patches of *Kunzea rupestris* with the presence of *Darwinia fascicularis* ssp. *oligantha.* The Western rock platform contains five patches of *Kunzea rupestris*. The overall health of the *Kunzea rupestris* population is reasonable considering that two years of dry conditions were experienced during 2017-2019. Some new recruitment was observed, particularly on specimens located on the western rock platform where vacant soil is available. New growth on most plants was observed during this survey period although no flower buds were noted this year. Mosses and lichens were present on both rock platforms.

The *Darwinia fascicularis* ssp. *oligantha* was observed to be plentiful in these locations with plants in flower and new recruits evident throughout. This species is also very well represented throughout the rehabilitation areas in the NVC.

Melaleuca deanei

The original specimens of *Melaleuca deanei* located in the Banksia heath plant community on Lot 2 is still undisturbed. Recent cuttings for nursery propagation were recently obtained in Spring 2020 with the aim of producing clones from the parent plant which will be planted in the rehabilitation area to achieve the offset numbers required. There appears to be no negative effects on the main plant from removal of small branches for propagation. During this monitoring period there is evidence that the parent plant has had a hard-shelled scale infestation which caused some individual leaves to die, however this does not appear to have had an effect on the overall plant health. No flowers on *Melaleuca deanei* were observed this period. Monitoring indicated that there are 31 stems in 18 clumps of *Melaleuca deanei* covering an area of approximately 25m^2 with the tallest specimen approximately 2.5m in height.

Tetratheca glandulosa

The *Tetratheca glandulosa* recorded onsite previously by Umwelt was not located during this year's survey. It is likely that the plant has suffered from prolonged dry conditions and died or have been consumed by herbivore grazers. However, the species has been identified in Quadrat 2 during this period including an abundance of flowering *Pimelea curviflora var curviflora*.

7.3.4 Threatened Fauna Monitoring

Old Northern Road Quarry

Feed trees for Glossy Black Cockatoo are confirmed to be present in the translocation rehabilitation area, transect 3 of the NVC and within the 250m buffer to the Maroota Public School. Two individual birds were observed feeding in trees within the translocation rehabilitation area during May 2021.

Results from utilising an AnaBat Express sound recorder revealed the presence of two species:

- *Miniopterus australis* (Little Bent-winged Bat), and
- *Mormopterus norfolkensis* (Eastern Free-tailed Bat).

AnaBat results also indicated potential occurrence of the following bat species:

- *Chalinolobus dwyeri* (Large-eared Pied Bat),
- *Miniopterus orianae* (Large Bent-winged Bat),
- *Scoteanax rueppellii* (Greater Broad-nosed Bat),
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle),
- *Myotis Macropus* (Southern Myotis), and
- *Vespadelus troughtoni* (Eastern Cave Bat).

Live trapping of bats was not conducted to reduce unnecessary stress on the fauna. Survey can be undertaken during the summer period to determine which species are likely to occur annually on site.

A pair of resident Wedge-tailed eagles were observed flying over the site several times during this monitoring period.

Haerses Road Biodiversity Offset Area

There is a historic Bionet record of a Koala and Glossy Black Cockatoo sighting to the north of HRBOA towards Hitchcock Road.

A search for Koala scat under *Eucalyptus punctata* within all survey quadrats at the HRBOA were undertaken and no scats were present. However, Koala sightings in the local area, particularly in Glenorie, have increased since the Wollemi/Yengo mega bushfire over the spring-summer of 2019 – 2020.

Glossy Black Cockatoo feed trees were recorded in Quadrat 1 and just east of Quadrat 2. More feed trees will likely to be observed over time within the site as more survey is carried out.

Several Brown Treecreepers were observed foraging at various locations which indicate their permanent presence and residents within the site.

A survey for microchiropteran bat species utilising an AnaBat Express sound recorder was carried out in January 2021.

The following species were identified:

- *Chalinolobus dwyeri* (Large-eared Pied Bat),
- *Mormopterus norfolkensis* (Eastern Free-tailed Bat), and
- *Miniopterus australis* (Little Bent-winged Bat).

The following species of bats may potential occur within the site however the recorded calls could not be confidently identified:

- Scoteanax rueppellii (Greater Broad-nosed Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle),
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat),
- *Myotis Macropus* (Southern Myotis), and
- *Vespadelus troughtoni* (Eastern Cave Bat).

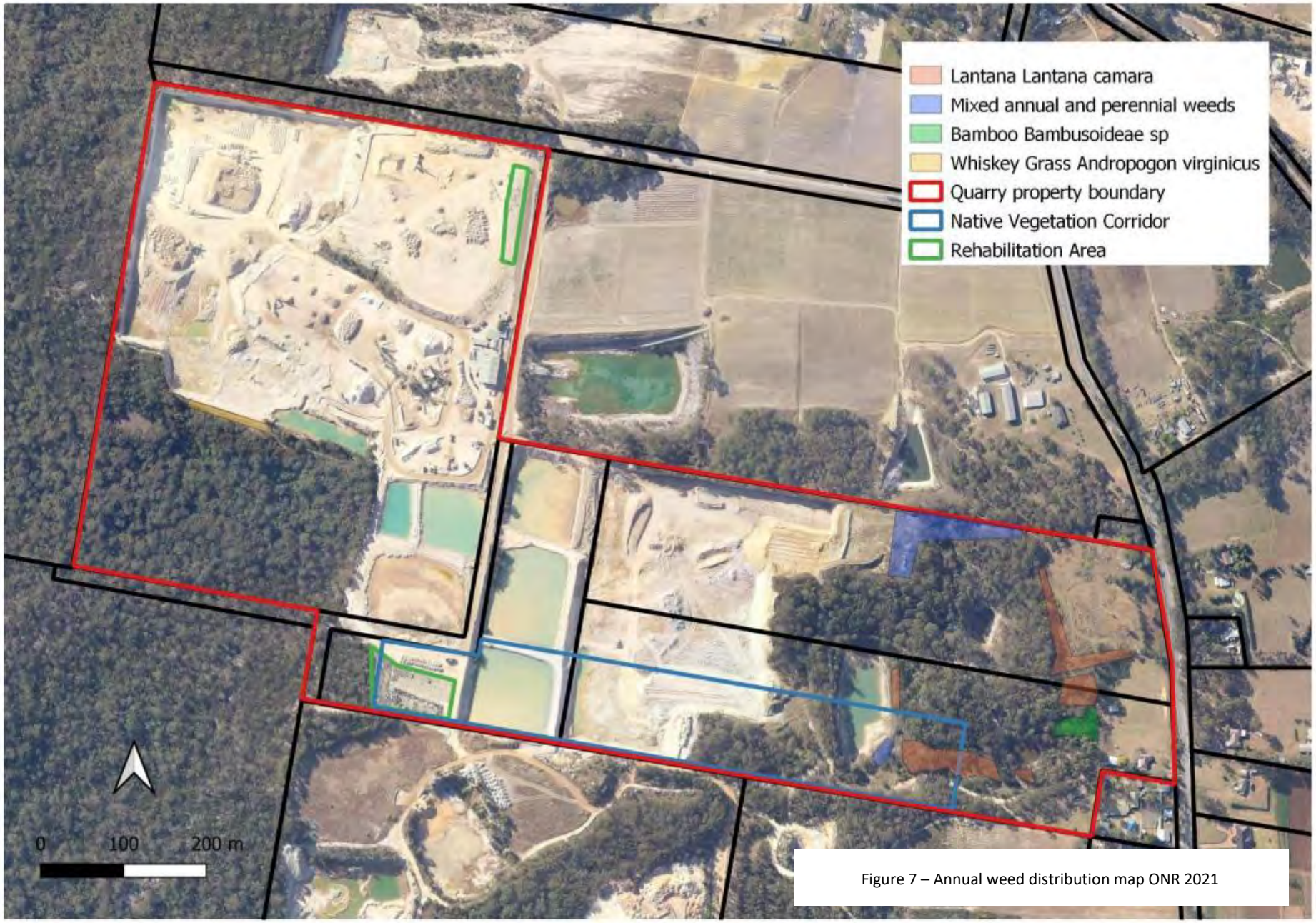


Figure 7 – Annual weed distribution map ONR 2021

7.3.5 Exotic Flora

A weed distribution map has been generated for the quarry during the previous reporting period. Weed species identified on this map will be the focus of weed management priority over the next reporting period. The map will be developed and updated annually. Figure 7 shows the updated weed distribution map.

The following weed species were identified within the NVC and 250m buffer area at the Old Northern Road Quarry:

- *Andropogon virginicus* (Whiskey Grass),
- *Senecio madagascariensis* (Fireweed),
- *Lantana camara* (Lantana),
- *Mixed annual and perennial weeds, and*
- *Bambusoideae sp.* (Bamboo)

Whiskey Grass, Fireweed and Lantana are classified as High Threat Weeds under the NSW *Biosecurity Act* 2015. Fireweed and Lantana are listed as Weeds of National Significance under the determination by the Commonwealth Government.

No weeds have been identified in the HRBOA.

Current progress of rehabilitation is in line with the 'Mid stage 2016 – 2023' staging of rehabilitation and rehabilitation strategy contained in Table 7.1 of the BRMP which includes:

- completion of rehabilitation on selected extracted areas on Lots 196 and 29,
- commencement of rehabilitation on strip 1,
- continual extraction on strips 2 and 3, and
- maintenance of previous revegetation, setbacks, buffer zones and bunds.

7.3.6 Pest Species Monitoring and Control

Feral pest species monitoring was undertaken by South East Environmental utilising infrared cameras, direct observation of prints and burrows, sand plots, scat identification and digs. The following feral pest species were identified to be present on the quarry premise:

- European Red Fox – identified through scat and sand pad,
- Noisy Minor – identified through on-site observation,
- Dog – identified through sand pad,
- Domestic Cat – identified through sand pad, and
- European Rabbit – identified through scat, digs and sand pad.

European rabbit scats were observed in several locations within the NVC in low to moderate density. Carnivore scats observed on site were highly likely to be those of European Red Fox. No rabbits were observed to be feeding during the day, scats were not in high density and warrens were not observed. The population of rabbits is therefore, considered to be low to moderate, and likely to be kept under control by biological means such as predation from foxes, dogs, cats and birds of prays such as Wedge-tailed Eagle that are present nearby. Should the number of rabbits become problematic, it may be necessary to engage in a control program to reduce or eliminate

the population. Noisy minors, although a native species, was observed within the NVC. Noisy minors are considered a pest if present in high density and is a key threatening process to a number of threatened native species of small birds such as the Brown Tree Creeper which is present in the area. The population of the Noisy Minor was considered to be small, and the presence of other small native bird species was observed on site. The population of the Noisy Minor is to be monitored over time and management strategy to be implemented to prevent the species from becoming dominant which can lead to elimination and displacement of other native bird species.

Tracks were regularly checked at the HRBOA identifying dog prints between Quadrats 1 and 2.

Overall, occurrences of fauna pest species are not at a level considered to require active management and on-going monitoring will be undertaken to determine appropriate dynamic management strategy.

7.3.7 Progressive Rehabilitation

Progressive rehabilitation of the quarry during this reporting period included:

- capping and settlement of the silt pond located on Lot 196 directly north of the current Native Vegetation Corridor (NVC). Part of the silt pond will form the northern boundary of the NVC and the remainder will be revegetated to Class 4 Agriculture.
- Capping and settlement of the silt pond located on Lot 29 directly east of the current haul road separating Lots 29 and 196. Once optimal status is obtained, stockpiled windrows of material and topsoil will be applied to this area for rehabilitation of Banksia Heath Community, extending east from the current NVC on Lot 29.

The locations of the capped and settling silt ponds are shown in Figure 8 below.

No revegetation was carried out for rehabilitation during this reporting period. Revegetation of the silt ponds may occur in the next reporting period if ground conditions are deemed suitable. Additional planting of propagated Melaleuca deanei was undertaken in the NVC.

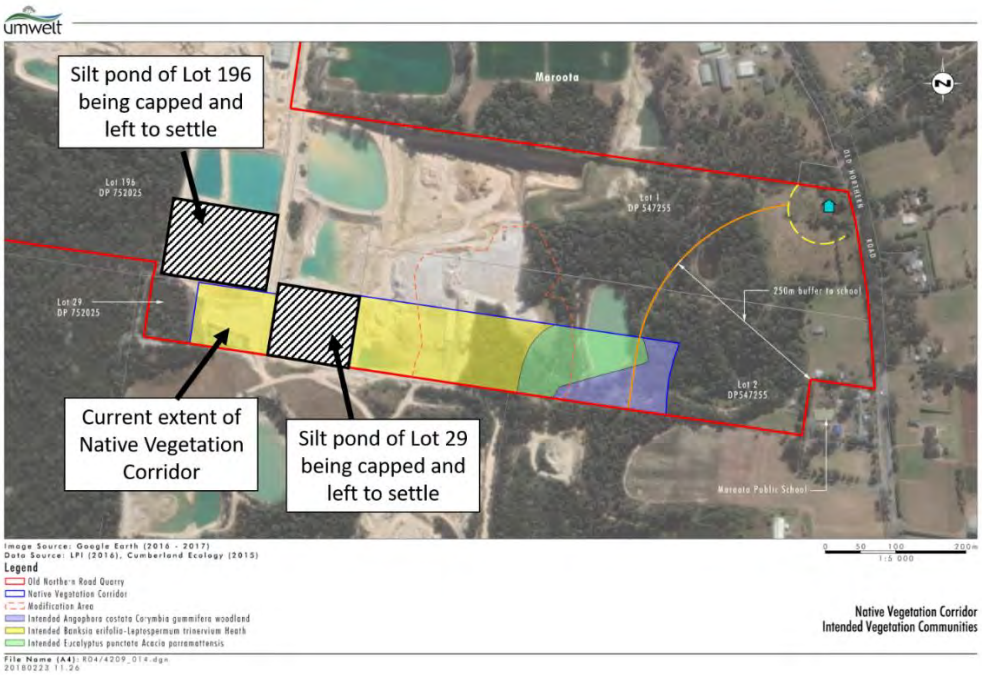


Figure 8: Locations of capped and settling silt ponds, in preparation for future rehabilitation/revegetation.

7.3.8 Progressive Achievement of Completion Criteria

Section 5.2 of the BRMP contains the preliminary rehabilitation performance and completion criteria. The status of targets being achieved against the preliminary rehabilitation performance and completion criteria are contained in Table 33.

Table 33: Assessment against criteria to monitor success of rehabilitation.

Aspect	Preliminary Rehabilitation Performance and Completion Criteria	Target Achieved	Comments
Decommissioning	All surface infrastructure will be decommissioned and removed.	N/A	Noted – completion criteria not yet triggered
Soil	Rehabilitated slopes are stable	Yes	Complied with – managed through a combination of weekly and monthly inspections by Quarry Managers and Environmental Officer, or Delegates. Aspects managed through mitigation measures contained in the Soil and Water Management.
	No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the end land use.		
	Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff.		
	Surface layer is free of any hazardous materials.		
Water	Runoff water quality from the site does not pose a threat to downstream water quality.	Yes	Complied with - aspect managed through downstream surface water monitoring, and other mitigation measures contained in the Soil and Water Management.
Native Vegetation	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities.	N/A	At this stage it is too early in the rehabilitation process to determine if the desired vegetation community is being established. Species planted have been specifically chosen to recreate a Banksia Heath community.
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e., evidence of fruiting of native species observed).	N/A	It is too early in the rehabilitation process for second generation tree seedlings. Fruiting of tree species is not expected for 5 years following the original planting (i.e., 2022).

Aspect	Preliminary Rehabilitation Performance and Completion Criteria	Target Achieved	Comments
	More than 75 per cent of trees are healthy and growing as indicated by long term monitoring.	Yes	More than 75% of the native vegetation within the active rehabilitation area is healthy and is growing as expected for long term survival. All shrub and ground cover species have reached maturity with flowering and seed production observed. Some species have begun self-propagation within rehabilitation sites. *Eucalyptus*, *Angophora* and *Corymbia* species have not yet reached maturity.
	More than 50 per cent of translocated or propagated threatened flora species survive as indicated by long term monitoring.	Yes	More than 50% of translocated and planted propagated threatened flora species has survived despite the dry conditions of the previous reporting period which led into this current reporting period. To date at least 45 propagated *Darwinia fascicularis subsp. Oligantha* and **41** propagated *Melaleuca deanei* have survived transplanting in the rehabilitation area. A complete count of translocated *Darwinia fascicularis subsp. Oligantha* was not undertaken at the time of relocation however it appears that any losses that may have occurred were minimal and new recruits are now visible throughout much of the area.
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum.	Yes	Minor weed species are present within the rehabilitation areas and are being effectively managed. Lantana is present on Lots 1 and 2, outside the rehabilitation area, and is being managed by licensed bush regenerator. Minimal weed presence in the NVC.
Stream and Riparian Zone Restoration	Drainage line stable displaying no signs of erosion	N/A	Noted – aspect not yet triggered.
	Weed species densities no greater than surrounding vegetation		
	Access to riparian zone is restricted		
	Riparian zone established to a width of 20 metres		

Aspect	Preliminary Rehabilitation Performance and Completion Criteria	Target Achieved	Comments
	Riparian zone is considered self-sustaining and exhibits 60% or more of the control site scores for each riparian condition monitoring attribute		
Weed and Pests	Regular inspections indicate a decline weed diversity, density and abundance and a decline in signs of feral animal activity.	Yes	On-going weed management by licensed bush regenerator aims to control the presence of Lantana within areas yet to be quarried to ensure the species do not spread and maximise quantity of translocatable materials. No weed species are present within the rehabilitation. On-going monitoring of feral animal activities will be undertaken to establish long term trend in occurrence and density, and to determine appropriate cause of action.
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum.	Yes	No weed infestation within the rehabilitation area.
	There is no evidence of significant damage resulting from feral animal activity	Yes	Occurrences of feral fauna species are not at a level considered to require active management and on-going monitoring will be undertaken to determine appropriate management strategy. There is no evidence of significant damage caused from feral animal activity within the rehabilitation area.
Bushfire Hazard	Appropriate bushfire hazard controls have been implemented.	Yes	Complied with – bushfire hazards are managed through the Bushfire Management Plan (Parts 1 and 2). Annual meeting between Dixon Sand and the representative of Rural Fire Service are carried out before the start of the bushfire season to review and revise the status of hazards and mitigation measures. The annual meeting was carried out on 25th August 2020 for this reporting period.
Ongoing Public Safety	Appropriate mechanisms are established to control access and manage public safety post-closure.	N/A	Noted – aspect not yet triggered

7.3.9 Stream Restoration

Riparian stream restoration has not commenced. The areas where the riparian stream was to be reinstated are either still being extracted or yet to be extracted.

7.3.10 Discussion and Recommendations

The prolonged drought conditions over the previous two monitoring periods have generally impacted on the health of vegetation. Average rainfall has returned this monitoring period which provided ideal growing conditions for the NVC rehabilitation area. Vegetation within all stratums have shown an increase in size, maturity and density over the last twelve months. New juvenile recruits can be observed within the shrub and groundcover species, and a slight increase in diversity being noted. Canopy species have shown to be growing well and should reach reproductive maturity within the next reporting period.

Other vegetation within the Old Northern Road quarry have shown to recovered well from previous drought conditions with average rainfall providing ideal growing conditions for groundcover species particularly forbs, grasses and ferns. Native vegetation within areas of no weedy growth have proven resilient with no new weed growth or establishment of weed during this higher rainfall period.

Vegetation changes within the HRBOA is observed to be minimal which provides a good demonstration of the hardiness of native vegetation stand with minimal historic disturbances.

The threatened *Kunzea rupestris* located west of the NVC have been affected by the prolonged two-year drought period. Some individual losses were evident and likely to be due to radiant heat reflection from the surrounding sandstone on the rock platforms. New juvenile recruits have been recorded since the return of rainfall, with further recruitment likely to occur over the next reporting period.

Other threatened species previously recorded on site appear to be in a healthy state.

On-going weed management at the Old Northern Road Quarry have successfully suppressed weed encroachment in the rehabilitation area of the NVC. Presence of weeds in other areas however will be the priority for the next reporting period. Management of Lantana within the NVC and 250m school buffer area at the Old Northern Road Quarry will be the priority for bush regeneration contractors to prohibit the spread of the weed into new areas which can form potential habitat for exotic fauna such as the European Red Fox and European Rabbit.

A silt pond directly east of the NVC rehabilitation area will be the designated area of new rehabilitation area, depending on the timing and readiness of the ground condition pending compaction and settlement of materials. Rehabilitation will also focus on the western embankment at the front entrance to the quarry site.

Continued propagation of threatened species and supplementary planting within the rehabilitation areas will be carried out.

7.4 Change in Environmental Procedures

Old Northern Road NVC Rehabilitation Area

- Continue to propagate from the planted/translocated threatened species specimens for future planting to achieve the required species offset numbers, and
- Continue with routine weed control and monitoring of regenerating native species.

Old Northern Road Lots 1 and 2

- Continued management of *Lantana camera* and review techniques recommended in the Ecological Monitoring Report (South East Environmental, 2021), and
- Continue to propagate from the original *Melaleuca deanei* specimens for future planting to achieve the required species offset numbers.

Old Northern Road other areas

- Continue with routine weed management along the southern boundary of Cons Hill (Lot 196) and carry out direct seeding or supplementary planting where suitable, and
- Continue with rehabilitation works along the western embankment at the Quarry entrance gate. Carry out direct seeding or supplementary planting where suitable.

Haerses Road Biodiversity Offset Area

- Continue with management of invasive grass and annual species along the North-western border of the HRBOA, and

8. Community and Social Impacts

8.1 Compliance

Dixon Sand is required to adhere to the following community related consent conditions:

Table 34: Community related consent conditions

Development Consent	Consent Condition	Requirement	Compliance
DA250-09-01	Condition 8 of Schedule 5	The Applicant must establish and operate a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. The CCC must be established by 10 October 2018 and operated in general accordance with the Department's Community Consultative Committee Guidelines, November 2016 (or later version). Notes: • The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent. • In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Applicant, Council and the local community. • The CCC established and operated prior to the approval of Modification 5 must continue to be operated in accordance with the procedures required by the consent prior to the approval of Modification 5 until such time as the CCC required by this condition is established.	The current CCC members were re-appointed by the DP&E on 1st March 2018 (note joint CCC for the Old Northern Road and Haerses Road quarries). Additional members have been endorsed by the Chair Person after this date.
DA250-09-01	Condition 1(e) of Schedule 5	describe the procedures to be implemented to: • keep the local community and relevant agencies informed about the operation and environmental performance of the development; • receive, record, handle and respond to complaints; • resolve any disputes that may arise during the course of the development; • respond to any non-compliance; • respond to emergencies; and	Refer to the Environmental Management Systems
DA165-7-2005	Condition 1(e) of Schedule 5		
DA250-09-01	Condition 1(f) of Schedule 5	include a Community Relations Plan, developed in consultation with	The Community Relations Plan is included as Appendix 11 of the

Development Consent	Consent Condition	Requirement	Compliance
		Council, the CCC, and the Maroota Public School, which includes: • identification of stakeholders potentially affected by the development; • detailed strategies to ensure open communication between the Applicant, the community and Maroota Public School; • detailed strategies to monitor and evaluate social impacts of the development on the local community and Maroota Public School; and • measures to improve community relations including: o quarry open days and education sessions to promote better understanding of quarry operations in the wider community; o participation in community activities; and o strategies involving in-kind exchanges of expertise and resources for activities such as bush regeneration, Landcare, Streamwatch, and other community-based environmental programs;	revised Environmental Management System
DA165-7-2005	Condition 8 of Schedule 5	The Applicant must establish and operate a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. The CCC must be established by 30 June 2018 and operated in general accordance with the Department's Community Consultative Committee Guidelines, November 2016 (or later version). Notes: • The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent. • In accordance with the guidelines, the Committee should comprise an independent chair and appropriate • representation from the Applicant, Council and the local community. • The CCC established and operated prior to the approval of Modification 1 must continue to be operated in accordance with the procedures required by the consent prior to the approval of Modification 1 until such time as	The current CCC members were re-appointed by the DP&E on 1st March 2018 (note joint CCC for the Old Northern Road and Haerses Road quarries). Additional members have been endorsed by the Chair Person after this date.

Development Consent	Consent Condition	Requirement	Compliance
		the CCC required by this condition is established. • The Applicant may, with the approval of the Secretary, combine the function of this CCC with the functions of other CCCs in the area.	

8.2 Complaints and Follow-up Actions

One complaint was received for the Old Northern Road Quarry during the 2020-2021 reporting period. A summary of the complaint is contained in Section 5.3.2.

A copy of the complaints register containing the details of the complaint received during the reporting period is contained in Appendix K.

8.3 Long Term Complaints Trend

Long term complaints monitoring data commencing since the 2003 – 2004 monitoring period is depicted in Chart 59 below. It must be noted that complaints were recorded for the Old Northern Road and Haerses Road quarries combined from the 2006 – 2007 to 2017 – 2018 monitoring periods, with complaints recorded separately for individual quarries from hereon.

A total of twenty-one complaints have been received by Dixon sand since the 2003 – 2004 monitoring period to date. The number complaints were between nil and up to three from the 2003 - 2004 to 2007 – 2008 monitoring periods, all of which were associated with haulage trucks driving in a dangerous manner or exceeding the speed limit.

During the 2008 – 2009 monitoring period, the number of complaints increased to six, with the majority associated with trucks driving in a dangerous manner or exceeding the school zone speed limit. One complaint was in regards to excessive noise generation where the source of noise was identified to be caused by a different operation.

From 2009 – 2010 to 2016 – 2017 monitoring periods, the number of complaints were minimal and fluctuated between nil and two. These complaints were associated with haulage trucks driving in a dangerous manner or exceeding the speed limit.

The 2016 – 2017 monitoring period recorded an increase in number of complaints to eight complaints which were associated with haulage trucks driving in a dangerous manner, excessive noise generation, operation outside of approved hours and excessive dust generation.

From this point, a downward trend in number of complaints was observed. The number of complaints received reduced to five haulage truck related complaints during the 2018 – 2019 monitoring period. The number of complaints

further reduced to two truck related complaints (exceedance of speed limit) during this 2019 – 2020 monitoring period. One haulage truck complaint (dangerous driving) was received in this monitoring period.

The majority of the complaints were made by residents of Maroota, residents of neighbouring suburbs or local road users. One complaint was made by Dixon Sand Quarry Manager. Timing of events leading to complaints were mainly during quarry operation hours with the exception of complaints associated with operations outside of consented hours. The locations of haulage trucks driving in a dangerous manner, exceeding the speed limit or excessively using engine brakes were mainly on Old Northern Road and Wisemans Ferry Road in the local areas.

Dixon Sand implemented the steps to identify the validity of the complaints received and employed appropriate actions outlined in the complaints procedure and the Maroota Local Traffic Management Policy (inter-pit policy). Several complaints were identified to have been associated with other operations within or outside the local areas. All complaints have been closed out.

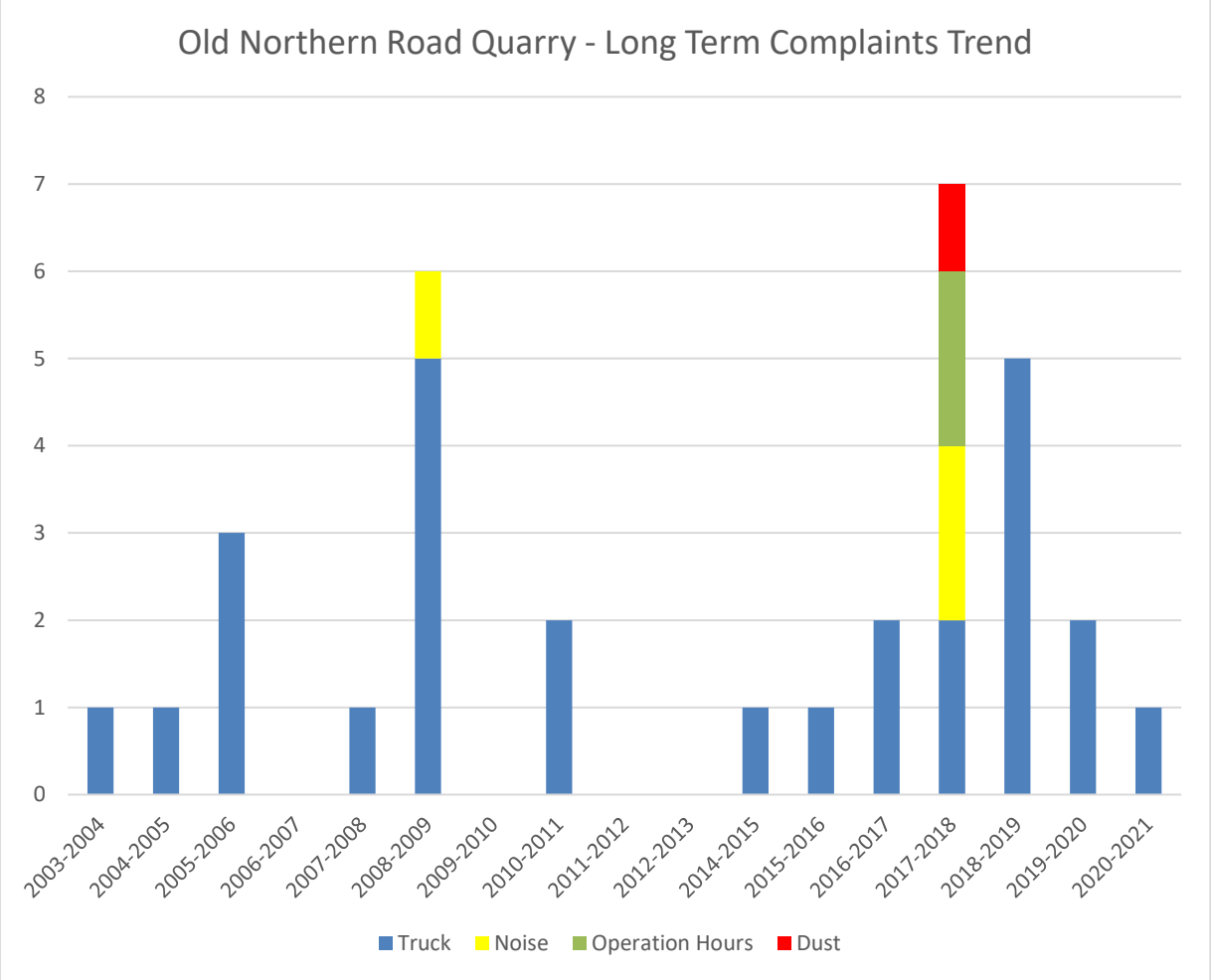


Chart 59: Long term complaints trend.

8.4 Community Consultative Committee, Meetings and Guidelines

Two CCC meetings were held in the 2020 - 2021 reporting period, in accordance with the consent conditions and CCC Guidelines (2016). The ordinary bi-annual CCC meetings were held on 11th November 2020 and 12th May 2021.

The minutes from the ordinary CCC meeting are provided in Appendix J.

8.5 Community and Stakeholder Liaison

In addition to contacting the Community Representatives of the CCC, the local community is provided with an opportunity to comment on Dixon Sand's environmental performance through direct contact with quarry staff or through the contact portal via the company's website.

Stakeholder Liaison and Correspondences

Dixon Sand staff made contact with local community members on a number of occasions. These include:

- Liaising with the neighbouring property owner to the Old Northern Road quarry regarding general maintenance,
- Notifying the Maroota Public School regarding noise monitoring undertaken in December 2020 and June 2021,
- Liaison with the Maroota Public School regarding any noise issues, and
- Bi-annual CCC meetings in November 2020 and May 2021

Local Initiatives

Dixon Sand regularly makes contributions to a number of community initiatives such as:

- monetary contribution to the Maroota Public School,
- monetary contribution to the Cattai Public School,
- monetary contribution to the Royal Flying Doctor Service, and
- publication of environmental monitoring data, and provision of all current consents and site management plans for public viewing on the Dixon Sand website.

Dixon Sand typically donates time and machine resources to the annual Maroota Muster however, the event did not take place during the 2020 – 2021 reporting period due to COVID-19 restrictions.

8.6 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) can be defined as "using, conserving and enhancing the community's resources so that the ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased" (Commonwealth of Australia, 1992).

The four principles of ESD are listed in Schedule 2 of the *Environmental Planning and Assessment Regulation* 2000 as follows:

- the precautionary principle;
- inter-generational equity;

- conservation of biological diversity and ecological integrity; and
- Improved valuation, pricing and incentive mechanisms.

Dixon Sand's Old Northern Road Quarry continue to manage all potential threats to the quality of the environment, determined with a reasonable degree of certainty through the use of scientific investigation and analysis of the individual and cumulative environmental impacts of the proposal.

Long-term environmental fluctuations have been, and will continue to be, monitored for the duration of extraction such as groundwater levels and quality, noise, air quality and threatened flora and fauna.

Threatened flora and fauna present on site is monitored annually to ensure they are not impacted by quarry activities. Similarly, noise and air quality monitoring will continue throughout the life of the developments. Mitigation measures are in place to minimise the potential adverse impacts likely to affect social and intergenerational equity. These measures relate to erosion and sediment control, surface and groundwater management, air quality control, and noise and waste management. Continual community relation strategies will ensure the community is well informed and has an effective means of voicing concerns and receiving feedback.

Dixon Sand aims to protect the biological diversity and ecological integrity of the sites through;

- progressive rehabilitation of the extracted areas using agricultural and native species;
- monitoring and maintenance of buffer areas to ecologically sensitive sites;
- establishment of native vegetation offset areas, biodiversity offset area and native rehabilitation areas to maximise native fauna habitats and enhance vegetation corridor for flora and fauna migration, and
- providing a final landform that integrates elements of the local area.

The value placed on environmental resources by Dixon Sand is represented as costs associated with the implementation of monitoring and mitigation measures throughout the life of the development consents.

8.7 Changes to Social Monitoring Procedures

No changes are proposed for the social management procedures.

9. Bushfire Management

9.1 Compliance

DA250-09-01 requires Dixon Sand to ensure that the Quarry is suitably equipped to respond to any fires on site. The Quarry is to assist the Rural Fire Service and emergency services to the extent practicable if there is a fire in the vicinity of the site.

A Bushfire Management Plan has been prepared for the Quarry.

An annual meeting between Dixon Sand and the representative of the Rural Fire Service was conducted on 25th August 2020 on the quarry premise to:

- review the Bushfire Management Plans,
- review risk assessment and procedures in the event of a bushfire,

- discuss key dates for the 2020-2021 bushfire season and any specific season predictions,
- discuss any planned hazard reduction burns in the area including locations, size and dates,
- discuss any changes to quarry operations which may affect bushfire risks, and
- discuss the locations of static water supplies including waters storage ponds and standpipe.

The meeting minutes are contained in Appendix M.

The outcome of the meeting was communicated to Dixon Staff in the form of a toolbox talk.

10. Competency, Training and Awareness

The quarry management team is responsible for ensuring all personnel, including contractors, are provided with appropriate environmental training and awareness to ensure they understand their environmental awareness, responsibilities and how to mitigate the impacts. Training is undertaken using the following avenues:

- Compulsory site environmental induction for employees and contractors,
- Truck driver induction training,
- Pollution Incident Response Management Plan (PIRMP) and mock scenario training,
- Two-stage pre-clearing procedures and fauna handling and rescue procedures training,
- Permit to discharge protocols,
- Environmental hazard identification workshop,
- Regular toolbox talks, and
- Bushfire Management and Emergency evacuation training.

11. Incidents and Non-Compliances

11.1 Environmental Incidents and Non-Compliances

Details of the incidents and non-compliances are listed in Table 35 below.

Table 35: Environmental Non-compliances and Incidents

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
1	30/11/2020	• Condition M2.4 of EPL 3916	**Details of Incident** Dixon Sand received a notification on 30th November 2020 at 1:06 am via a text alarm, alerting that the rolling 24-hour average PM10 level has reached 43.8 µg/m3 which exceeded the 42 µg/m3 criteria. A notification alerting that the rolling 24-hour average PM10 level has fallen below the 42 µg/m3 criteria was received on the same day at 1:06 pm. The exceeded rolling 24-hour average PM10 level was reported to the EPA on 30 November 2020 (Ref: C176677-2020). No additional request for information from the EPA is received to date. **Cause of Incident** As outlined by Condition M2.4 of EPL 3916, the north-westerly prevailing wind (between 270º and 315º) is the wind blowing from the quarry in the direction towards the receivers. A review of the meteorological data indicated that the prevailing wind directions were blowing easterly to south-easterly leading up to the PM10 exceedance. Elevated PM10 levels were a result of the heat wave and windy conditions which occurred across New South Wales on the previous two days, which is considered extraordinary event under ***Note d of Condition 7 of Schedule 3 of DA 250-09-01.*** **Mitigation Measures** The rolling 24-hour average PM10 exceedance was not attributed to quarry operations and therefore, quarry operations continued as normal. During this period, regular onsite dust suppression utilising the water cart was being undertaken. **Non-Compliance** The exceedance of rolling 24-hour average PM10 has triggered the reporting requirement of Condition M2.4 of EPL 3916, which assist the site operations to control any potential dust issues. Despite the exceeded rolling 24-hour average PM10, the daily 24-hour average PM10 on the day did not exceed the EPL and NEPM criteria of 42 µg/m3 and 50 µg/m3. The incident is <u>not considered</u> a non-compliance in this instance.
2	25/04/2021	• Condition 7 of Schedule 3 of DA 250-09-01, and • Conditions M2.4 of EPL 3916	**Details of Incident** The 24-hour average PM10 levels have exceeded the EPL 42 µg/m3 EPL criteria and NEPM 50 µg/m3 criteria contained in Table 3 of Condition 7 of Schedule 3 of DA 250-09-01. Dixon Sand received trigger alarm at 07:02 pm on Sunday 25/04/21 alerting that the rolling 24-hr average PM10 level has reached 43.1 µg/m3 which continued to rise and peaked at 53.6 µg/m3 between 09:05 pm and 10:00 pm.

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			The exceeded 24-hour average PM10 level (the incident) was notified and reported to the EPA and DPIE on 26 April 2021 (EPA Ref: REF-NO-1210) **Cause of Incident** A number of RFS hazard reduction burns were carried out across Greater Sydney and the Blue Mountains from the 23/04/21 to 26/04/21, including the ones in Fiddletown, Dural, Annangrove, Maroota and Penrith. RFS issued a smoke advisory for the public the morning of 26/04/21. The PM10 exceedance was not attributed to quarry operations as no quarry work are carried out on Sundays. **Mitigation Measures** Quarry operations continued as normal on Monday 26/04/21, with regular use of water cart for dust suppression. At the time of providing this notification, the 24-hour PM10 levels still continues to exceed the 50 µg/m3 criteria. Dixon Sand received a text alarm on 26/04/21 at 6:02 pm alerting that the rolling 24-hr average PM10 level has reduced to 38.2 µg/m3 **Non-Compliance** The exceedance of rolling 24-hour average PM10 has triggered the reporting requirement of Condition M2.4 of EPL 3916, which assist the site operations to control any potential dust issues. As the cause of PM10 exceedance is attributed to prescribed burns, the incident was caused by 'extraordinary events' as categorised in ***Note d*** **of Table 3 of Condition 7 of Schedule 3 of DA 25009-01.** Therefore, the PM10 exceedance (the incident) in this instance is not considered a non-compliance.
3	18/06/2021	• Condition 3 of Schedule 3 of DA250-09-01 • Conditions L4.1 and 4.2 of EPL3916	Dixon Sand engaged an acoustic consultant Hutchison Weller to undertake the 6-monthly noise monitoring at the Old Northern Road Quarry in June 2021. Attended Noise Monitoring was carried out on Friday 18th June 2021 at identified noise receivers. Due to ambient noise levels, a conclusive noise level attributable to the Quarry was not able to be determined during attended noise monitoring on the day. Subsequently noise modelling was undertaken by the acoustic consultant and the monitoring report was issued on 25th June 2021. The monitoring report identified noise exceedances at a number of receivers. Dixon Sand provided a preliminary incident notification to the Compliance Team of the Department on 28th June 2021 (addressed to: Maria Davis and Alfarid Hussain), in accordance with the requirement under Condition 9 of Schedule 5 of DA250-09-01. A detailed incident report was submitted to the DPIE on the Major Projects Portal on 29th June 2021 (DA250-09-01-PA-19). The Environment Protection Authority was also notified of the incident on 28th June 2021 (Incident Reference REF-NO-3614). Dixon Sand provided further information to the EPA on 7th July 2021 as requested by the EPA Officer Claudia Gilchrist. There has been no further correspondence from the EPA to-date. **Details of Incident** The daytime period noise criteria contained in Table 2 of Condition 3, Schedule 3 of DA 250-09-01 were exceeded at the following receivers:

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			• 10:27 am at Receiver OR1 (Maroota Public School) – exceedance of 1 dB(A), • 11:35 am at Receivers 4&5 (4547 – 4543 Old Northern Road, Maroota) – exceedance of 1 dB(A), and • 10:27am at Receiver OR3 (4634 Old Northern Road, Maroota) – exceedance of 2 dB(A). A noise agreement is in place between Dixon Sand and the Acurso family who reside at 4590 and 4624 Old Northern Road (receivers R1 and OR2). Therefore, the noise criteria outlined in Condition 3 of Schedule 3 of DA250-09-01 do not apply at these residents. **Cause of Incident** Once Dixon Sand was made aware of the noise exceedance, an investigation was carried out which enabled the Quarry's management to identify the specific equipment causing the noise exceedance. It was determined that noise exceedances were attributed to the quarry ripping hard rock. This procedure of ripping hard rock is not typical as ripping is normally conducted closer to the working face of the extraction pit and where softer materials are located. Hard stone would typically be cut by the utilisation of an excavator with a saw attachment. **Mitigation Measures** The Quarry undertook additional noise monitoring on 22nd June 2021 and modelling for the 'business as normal' procedure where the dozer was relocated to the location of softer materials near the quarry face. Table 6 of the Noise Monitoring Report (Hutchison Weller, June 2021) presents the monitoring results for the alternative 'business as usual' scenario. Extrapolated results of the 'business as usual' scenario indicated lower levels of noise being generated by the operation which would be compliant with the noise criteria. Under this circumstance, the extraction pit wall acted as additional noise barrier and noise generated by the dozer would be quieter. Therefore, to prevent any re-occurrence of the noise exceedance during this incident, the scenario of ripping hard rock will not be repeated for the foreseeable future. **Non-Compliance** In accordance with Section 11.1.3 of the NSW Industrial Noise Policy (EPA, 2000), a development will be deemed to be in non-compliance with a noise consent or license condition if the monitored noise level is more than 2 dB above the statutory noise limit. The noise exceedances resulted from the noise modelling did not exceed the noise criteria by more than 2 dB. Therefore, noise exceedances during this incident are not deemed a non-compliance. The DPIE issued a Warning Letter to Dixon Sand on 21 July 2021 detailing the breach of Section 4.2(1)(b) of the EP&A Act (1979) due to the late notification of this particular incident. The late notification was due to the noise monitoring report being issued after 7 days of the incident. No further action is required.

11.2 Section 191 Improvement Notice

Dixon Sand did not receive any improvement notices under Section 191 Improvement Notices of the *Work Health and Safety Act* 2011 from NSW Resources Regulator during this reporting period.

12. Independent Environmental Audit

12.1 Independent Environmental Audit Requirements

Condition 14 of Schedule 5 of DA 250-09-01 requires:

> *Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The Applicant must implement these recommendations, to the satisfaction of the Secretary.*

The appointment of R.W. Corkery and Co Pty Ltd (RWC) to carry out the Independent Environmental Audit (IEA) for Old Northern Road Quarry was approved by the Department of Planning, Industry and Environment (DPIE) on 11th July 2019.

The IEA commenced on 22 October 2019 and the *Independent Environmental Audit: Old Northern Road Report* (RW Corkery & Co, January 2020, Document No. 1021/01) issued on 10th January 2020.

The *Response and Action Plan for the Independent Environmental Audit 2019, Old Northern Road Quarry* document was prepared to provide Dixon Sand's response and proposed actions addressing the IEA findings, recommendations for non-compliances and suggested improvements as identified in *the Independent Environmental Audit: Old Northern Road Report* (RW Corkery & Co, January 2020, Document No. 1021/01). This document has been prepared in accordance with the *Independent Audit – Post Approval Requirements June 2018* (Department of Planning and Environment, 2018).

The IEA report and Response and Action Plan report were submitted to the DPIE on 13th January 2020. The CCC members and other Agencies were provided a link to the reports published on Dixon Sand's website.

All proposed actions from the IEA 2019 have been implemented and closed out except for one item as is listed in Table 36 below. The matter of application to enact the Positive Public Covenant for the Haerses Road Biodiversity Offset Area is still on-going and terms of agreement still in negotiation between Dixon Sand and the DPIE.

Table 36: Outstanding Proposed Action, Implementation Timeframe and Status for the Recommendations arising from IEA Non-Compliances.

ID	IEA Comments and Recommended Action	Proposed Action and Implementation Timeframe by Dixon Sand
ONR R2/19	Ensure that the Positive Public Covenant or other agreed method for providing long-term security of the Haerses Road Biodiversity Offset Area is implemented. *DA 250-09-01 Schedule 3 Condition 25(c) requires that a long-term security is provided for the Haerses Road Biodiversity Offset Area. Whilst proposed terms for a Public Positive Covenant have now been submitted, confirmation of these terms is awaited from DPIE. It is important that the Company remains proactive in following up and implementing the required security.*	**Proposed Action:** Confirmation awaiting from DPIE regarding the conditional terms for the Positive Public Covenant. Once finalised, an application to enact the Positive Public Covenant for the Haerses Road Biodiversity Offset Area will be submitted. **Implementation Timeframe:** Application to enact the Positive Public Covenant for Haerses Road Biodiversity Offset Area will be processed once Dixon Sand receives confirmation from the DPIE regarding the condition terms. **Status:** Open - matter in liaison with the DPIE

13. Proposed Actions to be completed in the next Reporting Period

13.1 Vegetation Clearing and Extraction

Vegetation clearing will be undertaken in accordance with the Pre-clearing procedures.

13.2 Rehabilitation and Bush Regeneration

Old Northern Road NVC Rehabilitation Area

- Continue to propagate from the planted/translocated threatened species specimens for future planting to achieve the required species offset numbers, and
- Continue with routine weed control and monitoring of regenerating native species.

Old Northern Road Lots 1 and 2

- Continued management of *Lantana camera* and review techniques recommended in the Ecological Monitoring Report (South East Environmental, 2021), and
- Continue to propagate from the original *Melaleuca deanei* specimens for future planting to achieve the required species offset numbers.

Old Northern Road other areas

- Continue with routine weed management along the southern boundary of Cons Hill (Lot 196) and carry out direct seeding or supplementary planting where suitable, and

- Continue with rehabilitation works along the western embankment at the Quarry entrance gate. Carry out direct seeding or supplementary planting where suitable.

Haerses Road Biodiversity Offset Area

- Continue with management of invasive grass and annual species along the North-western border of the HRBOA, and

14. Conclusion

A number of recommendations and change in environmental procedures have been proposed throughout this Annual Review of 2020 – 2021 reporting period.

In general, Dixon Sand has maintained acceptable environmental performance outcomes throughout the reporting period. The company has committed to ongoing endeavours to minimise environmental impacts and potential exceedances related to quarry operations.

Appendix A – Dust Deposition Reports

Report Number: 9380

Date Issued: 30/07/2020

Revision Number: 00

Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

vgt Laboratories Pty Ltd
PO Box 2335 Greenhills NSW 2323
P (02)4028 6412 E mail@vgt.com.au
www.vgt.com.au ABN 77 621 943 600

The following 9 samples were received on 24/07/2020 and tested at 4/30 Glenwood Dr Thornton, NSW 2322

Client Sample Reference	GPS-Easting	GPS-Northing	Date Sampled	Lab ID	Matrix	Comment or Non-compliances
D08&9 Hitchcock Rd Olive Grove	313058	6295137	24/07/2020	9380/1	Dust	
D10 Hearses Rd	312538	6294576	24/07/2020	9380/2	Dust	
D06 School	313518	6296537	24/07/2020	9380/3	Dust	Minor insects
D05 Bund	313160	6296838	24/07/2020	9380/4	Dust	Recent land clearing adjacent
D04 Rehab	312385	6296932	24/07/2020	9380/5	Dust	
D07 Mullock	312579	6296676	24/07/2020	9380/6	Dust	
D01(A) Front Gate	313290	6297176	24/07/2020	9380/7	Dust	
D11 Goldstien	312034	6294213	24/07/2020	9380/8	Dust	
D12 Ram	311750	6294159	24/07/2020	9380/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)

Anthony Crane
Laboratory Manager

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

Test Report Number: 9380

Date Issued: 30/07/2020
Tested between: 24/07/20 and 30/07/20

vgt Laboratories Pty Ltd

Results

Lab ID	Client Sample Reference	Date On	Date Off Units Method Code Limit of Report	Number of Days days AS 3580.10.1	Insoluble Solids g/m2/mth AS 3580.10.1 0.1	Ash g/m2/mth AS 3580.10.1 0.1	Combustible Matter g/m2/mth AS 3580.10.1 0.1	Calculated Rain mm AS 3580.10.1 1
9380/1	D08&9 Hitchcock Rd Olive Grove	26/06/2020 10:52	24/07/2020 11:12	28	0.3	0.2	0.1	34
9380/2	D10 Hearses Rd	26/06/2020 13:28	24/07/2020 15:41	28	0.5	0.2	0.3	33
9380/3	D06 School	26/06/2020 10:45	24/07/2020 11:06	28	3.3	2.5	0.8	34
9380/4	D05 Bund	26/06/2020 10:37	24/07/2020 10:56	28	1.2	0.8	0.4	31
9380/5	D04 Rehab	26/06/2020 10:11	24/07/2020 10:24	28	<0.1	<0.1	<0.1	31
9380/6	D07 Mullock	26/06/2020 10:23	24/07/2020 10:36	28	0.1	0.1	<0.1	31
9380/7	D01(A) Front Gate	26/06/2020 09:49	24/07/2020 10:42	28	1.2	1.1	0.1	32
9380/8	D11 Goldstien	26/06/2020 13:15	24/07/2020 14:49	28	0.1	0.1	<0.1	30
9380/9	D12 Ram	26/06/2020 11:35	24/07/2020 15:49	28	0.1	0.1	<0.1	32

Results have been approved and report finalised on 30/07/2020

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

Sampling Report Number: 9380

Date Issued: 30/07/2020
Sampling Conditions: Cloudy 12°-17°C

Lab ID	Client Sample Reference	Date Sampled	Sampler	Method of Sampling	Pre-treatment / Preservation	Comments
9380/1	D08&9 Hitchcock Rd Olive Grove	24/07/2020 11:12	D.Walker	AS3580.10.1	CuSO4	
9380/2	D10 Hearses Rd	24/07/2020 15:41	D.Walker	AS3580.10.1	CuSO4	
9380/3	D06 School	24/07/2020 11:06	D.Walker	AS3580.10.1	CuSO4	
9380/4	D05 Bund	24/07/2020 10:56	D.Walker	AS3580.10.1	CuSO4	
9380/5	D04 Rehab	24/07/2020 10:24	D.Walker	AS3580.10.1	CuSO4	
9380/6	D07 Mullock	24/07/2020 10:36	D.Walker	AS3580.10.1	CuSO4	
9380/7	D01(A) Front Gate	24/07/2020 10:42	D.Walker	AS3580.10.1	CuSO4	
9380/8	D11 Goldstien	24/07/2020 14:49	D.Walker	AS3580.10.1	CuSO4	
9380/9	D12 Ram	24/07/2020 15:49	D.Walker	AS3580.10.1	CuSO4	

Sampling procedures have been approved and report finalised on 30/07/2020
Where method is "unknown" sampling procedures are not endorsed.

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Report Number: 9502

Date Issued: 31/08/2020

Revision Number: 00

Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

vgt Laboratories Pty Ltd
PO Box 2335 Greenhills NSW 2323
P (02)4028 6412 E mail@vgt.com.au
www.vgt.com.au ABN 77 621 943 600

The following 9 samples were received on 21/08/2020 and tested at 4/30 Glenwood Dr Thornton, NSW 2322

Client Sample Reference	GPS-Easting	GPS-Northing	Date Sampled	Lab ID	Matrix	Comment or Non-compliances
D08&9 Hitchcock Rd Olive Grove	313058	6295137	21/08/2020	9502/1	Dust	
D10 Hearses Rd	312538	6294576	21/08/2020	9502/2	Dust	
D06 School	313518	6296537	21/08/2020	9502/3	Dust	
D05 Bund	313160	6296838	21/08/2020	9502/4	Dust	
D04 Rehab	312385	6296932	21/08/2020	9502/5	Dust	
D07 Mullock	312579	6296676	21/08/2020	9502/6	Dust	
D01(A) Front Gate	313290	6297176	21/08/2020	9502/7	Dust	
D11 Goldstien	312034	6294213	21/08/2020	9502/8	Dust	
D12 Ram	311750	6294159	21/08/2020	9502/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)

Anthony Crane
Laboratory Manager

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

Test Report Number: 9502

Date Issued: 31/08/2020
Tested between: 21/08/20 and 31/08/20

Results

Lab ID	Client Sample Reference	Date On	Date Off Units Method Code PQL	Number of Days days AS 3580.10.1	Insoluble Solids g/m2/mth AS 3580.10.1 0.1	Ash g/m2/mth AS 3580.10.1 0.1	Combustible Matter g/m2/mth AS 3580.10.1 0.1	Calculated Rain mm AS 3580.10.1 1
9502/1	D08&9 Hitchcock Rd Olive Grove	24/07/2020 11:12	21/08/2020 11:04	28	0.5	0.4	0.1	205
9502/2	D10 Hearses Rd	24/07/2020 15:41	21/08/2020 15:30	28	0.4	0.3	0.1	213
9502/3	D06 School	24/07/2020 11:06	21/08/2020 09:58	28	1.1	0.7	0.4	215
9502/4	D05 Bund	24/07/2020 10:56	21/08/2020 10:38	28	1.6	1.0	0.6	203
9502/5	D04 Rehab	24/07/2020 10:24	21/08/2020 10:16	28	0.2	0.1	0.1	195
9502/6	D07 Mullock	24/07/2020 10:36	21/08/2020 10:24	28	0.3	0.3	<0.1	205
9502/7	D01(A) Front Gate	24/07/2020 10:42	21/08/2020 10:04	28	3.0	2.6	0.4	116
9502/8	D11 Goldstien	24/07/2020 14:49	21/08/2020 14:37	28	0.5	0.2	0.3	201
9502/9	D12 Ram	24/07/2020 15:49	21/08/2020 10:56	28	0.4	0.2	0.2	207

Results have been approved and report finalised on 31/08/2020

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Sampling Report Number: 9502

Date Issued: 31/08/2020
Sampling Conditions: Cloudy 14°-17°C

Lab ID	Client Sample Reference	Date Sampled	Sampler	Method of Sampling	Pre-treatment / Preservation	Comments
9502/1	D08&9 Hitchcock Rd Olive Grove	21/08/2020 11:04	D.Walker	AS3580.10.1	CuSO4	
9502/2	D10 Hearses Rd	21/08/2020 15:30	D.Walker	AS3580.10.1	CuSO4	
9502/3	D06 School	21/08/2020 09:58	D.Walker	AS3580.10.1	CuSO4	
9502/4	D05 Bund	21/08/2020 10:38	D.Walker	AS3580.10.1	CuSO4	Minor vegetation, trimmed adjacent wattles
9502/5	D04 Rehab	21/08/2020 10:16	D.Walker	AS3580.10.1	CuSO4	
9502/6	D07 Mullock	21/08/2020 10:24	D.Walker	AS3580.10.1	CuSO4	
9502/7	D01(A) Front Gate	21/08/2020 10:04	D.Walker	AS3580.10.1	CuSO4	Full
9502/8	D11 Goldstien	21/08/2020 14:37	D.Walker	AS3580.10.1	CuSO4	
9502/9	D12 Ram	21/08/2020 10:56	D.Walker	AS3580.10.1	CuSO4	

Sampling procedures have been approved and report finalised on 31/08/2020
Where method is "unknown" sampling procedures are not endorsed.

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Report Number: 9656

Date Issued: 25/09/2020

Revision Number: 00

Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

vgt Laboratories Pty Ltd
PO Box 2335 Greenhills NSW 2323
P (02)4028 6412 E mail@vgt.com.au
www.vgt.com.au ABN 77 621 943 600

The following 9 samples were received on 18/09/2020 and tested at 4/30 Glenwood Dr Thornton, NSW 2322

Client Sample Reference	GPS-Easting	GPS-Northing	Date Sampled	Lab ID	Matrix	Comment or Non-compliances
D08&9 Hitchcock Rd Olive Grove	313058	6295137	18/09/2020	9656/1	Dust	
D10 Hearses Rd	312538	6294576	18/09/2020	9656/2	Dust	
D06 School	313518	6296537	18/09/2020	9656/3	Dust	
D05 Bund	313160	6296838	18/09/2020	9656/4	Dust	
D04 Rehab	312385	6296932	18/09/2020	9656/5	Dust	
D07 Mullock	312579	6296676	18/09/2020	9656/6	Dust	
D01(A) Front Gate	313290	6297176	18/09/2020	9656/7	Dust	
D11 Goldstien	312034	6294213	18/09/2020	9656/8	Dust	
D12 Ram	311750	6294159	18/09/2020	9656/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)

Anthony Crane
Laboratory Manager

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

Test Report Number: 9656

Date Issued: 25/09/2020
Tested between: 18/09/20 and 25/09/20

vgt Laboratories Pty Ltd

Results

Lab ID	Client Sample Reference	Date On	Date Off Units Method Code PQL	Number of Days days AS 3580.10.1	Insoluble Solids g/m2/mth AS 3580.10.1 0.1	Ash g/m2/mth AS 3580.10.1 0.1	Combustible Matter g/m2/mth AS 3580.10.1 0.1	Calculated Rain mm AS 3580.10.1 1
9656/1	D08&9 Hitchcock Rd Olive Grove	21/08/2020 11:04	18/09/2020 09:09	28	0.9	0.6	0.3	26
9656/2	D10 Hearses Rd	21/08/2020 15:30	18/09/2020 13:28	28	0.5	0.4	0.1	25
9656/3	D06 School	21/08/2020 09:58	18/09/2020 08:19	28	0.8	0.7	0.1	28
9656/4	D05 Bund	21/08/2020 10:38	18/09/2020 08:29	28	1.5	1.2	0.3	28
9656/5	D04 Rehab	21/08/2020 10:16	18/09/2020 08:52	28	0.3	0.3	<0.1	25
9656/6	D07 Mullock	21/08/2020 10:24	18/09/2020 09:01	28	0.4	0.3	0.1	26
9656/7	D01(A) Front Gate	21/08/2020 10:04	18/09/2020 08:37	28	2.0	1.6	0.4	29
9656/8	D11 Goldstien	21/08/2020 14:37	18/09/2020 12:48	28	0.5	0.3	0.2	26
9656/9	D12 Ram	21/08/2020 10:56	18/09/2020 13:36	28	0.4	0.2	0.2	28

Results have been approved and report finalised on 25/09/2020

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

Sampling Report Number: 9656

Date Issued: 25/09/2020
Sampling Conditions: Cloudy 13°-15°C

Lab ID	Client Sample Reference	Date Sampled	Sampler	Method of Sampling	Pre-treatment / Preservation	Comments
9656/1	D08&9 Hitchcock Rd Olive Grove	18/09/2020 09:09	D.Walker	AS3580.10.1	CuSO4	Insects
9656/2	D10 Hearses Rd	18/09/2020 13:28	D.Walker	AS3580.10.1	CuSO4	Minor insects
9656/3	D06 School	18/09/2020 08:19	D.Walker	AS3580.10.1	CuSO4	Minor insects
9656/4	D05 Bund	18/09/2020 08:29	D.Walker	AS3580.10.1	CuSO4	Minor insects
9656/5	D04 Rehab	18/09/2020 08:52	D.Walker	AS3580.10.1	CuSO4	
9656/6	D07 Mullock	18/09/2020 09:01	D.Walker	AS3580.10.1	CuSO4	
9656/7	D01(A) Front Gate	18/09/2020 08:37	D.Walker	AS3580.10.1	CuSO4	Minor insects
9656/8	D11 Goldstien	18/09/2020 12:48	D.Walker	AS3580.10.1	CuSO4	
9656/9	D12 Ram	18/09/2020 13:36	D.Walker	AS3580.10.1	CuSO4	Minor insects

Sampling procedures have been approved and report finalised on 25/09/2020
Where method is "unknown" sampling procedures are not endorsed.

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 9786

Date Issued: 27/10/2020 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

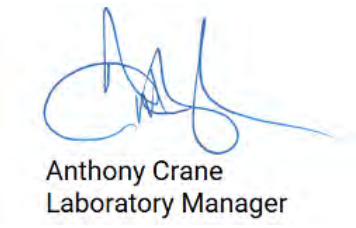
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 16/10/2020

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	18/09/2020 09:09	16/10/2020 09:03	9786/1	Dust	
D10 Hearses Rd	18/09/2020 13:28	16/10/2020 09:36	9786/2	Dust	
D06 School	18/09/2020 08:19	16/10/2020 08:58	9786/3	Dust	
D05 Bund	18/09/2020 08:29	16/10/2020 08:51	9786/4	Dust	
D04 Rehab	18/09/2020 08:52	16/10/2020 08:30	9786/5	Dust	
D07 Mullock	18/09/2020 09:01	16/10/2020 08:40	9786/6	Dust	
D01(A) Front Gate	18/09/2020 08:37	16/10/2020 08:12	9786/7	Dust	
D11 Goldstien	18/09/2020 12:48	16/10/2020 13:02	9786/8	Dust	
D12 Ram	18/09/2020 13:36	16/10/2020 09:24	9786/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by: Anthony Crane
Laboratory Manager

Results have been approved and report finalised on 27/10/2020.

Test Report Number: 9786

Date Issued: 27/10/2020 Revision No: 00

Results

Ambient Air	Method	Units	9786/1 D08&9 Hitchcock Rd Olive Grove 16/10/2020	9786/2 D10 Hearses Rd 16/10/2020	9786/3 D06 School 16/10/2020	9786/4 D05 Bund 16/10/2020	9786/5 D04 Rehab 16/10/2020
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	0.5	0.5	3.3	0.2
Ash	AS 3580.10.1	g/m2/mth	0.5	0.4	0.5	1.5	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.1	<0.1	1.8	<0.1
Calculated Rain	AS 3580.10.1	mm	7	12	15	14	13

Ambient Air	Method	Units	9786/6 D07 Mullock 16/10/2020	9786/7 D01(A) Front Gate 16/10/2020	9786/8 D11 Goldstien 16/10/2020	9786/9 D12 Ram 16/10/2020
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.4	0.8	0.4	0.4
Ash	AS 3580.10.1	g/m2/mth	0.4	0.7	0.2	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	0.1	0.2	0.2
Calculated Rain	AS 3580.10.1	mm	13	14	12	13

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Results in Bold indicate an exceedance of prescribed limit as set out in relevent EPL.
When considering the pass or fail of tests against limits,
the measurement of uncertainty of each parameter must be considered.

Sampling Report Number: 9786

Date Issued: 27/10/2020 Revision No: 00

Sampling Conditions: Cloudy 18°-22°C

Lab ID	Client Sample Reference	Licence Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
9786/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	16/10/2020 09:03	AS3580.10.1	CuSO4
9786/2	D10 Hearses Rd		D.Walker	16/10/2020 09:36	AS3580.10.1	CuSO4
9786/3	D06 School		D.Walker	16/10/2020 08:58	AS3580.10.1	CuSO4
9786/4	D05 Bund		D.Walker	16/10/2020 08:51	AS3580.10.1	CuSO4
9786/5	D04 Rehab		D.Walker	16/10/2020 08:30	AS3580.10.1	CuSO4
9786/6	D07 Mullock		D.Walker	16/10/2020 08:40	AS3580.10.1	CuSO4
9786/7	D01(A) Front Gate		D.Walker	16/10/2020 08:12	AS3580.10.1	CuSO4
9786/8	D11 Goldstien		D.Walker	16/10/2020 13:02	AS3580.10.1	CuSO4
9786/9	D12 Ram		D.Walker	16/10/2020 09:24	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
9786/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Insects
9786/2	D10 Hearses Rd	312538	6294576	Minor insects
9786/3	D06 School	313518	6296537	Minor insects
9786/4	D05 Bund	313160	6296838	Vegetation
9786/5	D04 Rehab	312385	6296932	Minor vegetation
9786/6	D07 Mullock	312579	6296676	
9786/7	D01(A) Front Gate	313290	6297176	Insects
9786/8	D11 Goldstien	312034	6294213	Minor vegetation
9786/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 27/10/2020.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 9891

Date Issued: 24/11/2020 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

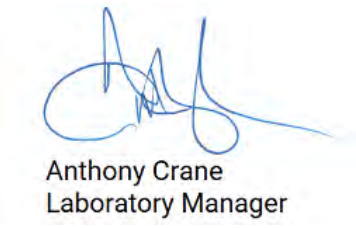
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 13/11/2020

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	16/10/2020 09:03	13/11/2020 10:14	9891/1	Dust	
D10 Hearses Rd	16/10/2020 09:36	13/11/2020 15:16	9891/2	Dust	
D06 School	16/10/2020 08:58	13/11/2020 09:20	9891/3	Dust	
D05 Bund	16/10/2020 08:51	13/11/2020 10:05	9891/4	Dust	
D04 Rehab	16/10/2020 08:30	13/11/2020 09:44	9891/5	Dust	
D07 Mullock	16/10/2020 08:40	13/11/2020 09:52	9891/6	Dust	
D01(A) Front Gate	16/10/2020 08:12	13/11/2020 09:26	9891/7	Dust	
D11 Goldstien	16/10/2020 13:02	13/11/2020 15:08	9891/8	Dust	
D12 Ram	16/10/2020 09:24	13/11/2020 10:36	9891/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 24/11/2020.

Test Report Number: 9891

Date Issued: 24/11/2020 Revision No: 00

Results

Ambient Air	Method	Units	9891/1 D08&9 Hitchcock Rd Olive Grove 13/11/2020	9891/2 D10 Hearses Rd 13/11/2020	9891/3 D06 School 13/11/2020	9891/4 D05 Bund 13/11/2020	9891/5 D04 Rehab 13/11/2020
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.0	2.1	0.7	0.9	0.4
Ash	AS 3580.10.1	g/m2/mth	0.8	1.0	0.5	0.7	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	1.1	0.2	0.2	0.1
Calculated Rain	AS 3580.10.1	mm	169	162	162	159	150

Ambient Air	Method	Units	9891/6 D07 Mullock 13/11/2020	9891/7 D01(A) Front Gate 13/11/2020	9891/8 D11 Goldstien 13/11/2020	9891/9 D12 Ram 13/11/2020
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.4	0.7	0.4	0.4
Ash	AS 3580.10.1	g/m2/mth	0.3	0.6	0.2	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.1	0.2	0.2
Calculated Rain	AS 3580.10.1	mm	153	116	147	155

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Results in Bold indicate an exceedance of prescribed limit as set out in relevent EPL.
When considering the pass or fail of tests against limits,
the measurement of uncertainty of each parameter must be considered.

Sampling Report Number: 9891

Date Issued: 24/11/2020 Revision No: 00

Sampling Conditions: Intermittent showers, 21°-27°C

Lab ID	Client Sample Reference	Licence Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
9891/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	13/11/2020 10:14	AS3580.10.1	CuSO4
9891/2	D10 Hearses Rd		D.Walker	13/11/2020 15:16	AS3580.10.1	CuSO4
9891/3	D06 School		D.Walker	13/11/2020 09:20	AS3580.10.1	CuSO4
9891/4	D05 Bund		D.Walker	13/11/2020 10:05	AS3580.10.1	CuSO4
9891/5	D04 Rehab		D.Walker	13/11/2020 09:44	AS3580.10.1	CuSO4
9891/6	D07 Mullock		D.Walker	13/11/2020 09:52	AS3580.10.1	CuSO4
9891/7	D01(A) Front Gate		D.Walker	13/11/2020 09:26	AS3580.10.1	CuSO4
9891/8	D11 Goldstien		D.Walker	13/11/2020 15:08	AS3580.10.1	CuSO4
9891/9	D12 Ram		D.Walker	13/11/2020 10:36	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
9891/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
9891/2	D10 Hearses Rd	312538	6294576	Bird droppings, algae
9891/3	D06 School	313518	6296537	
9891/4	D05 Bund	313160	6296838	
9891/5	D04 Rehab	312385	6296932	
9891/6	D07 Mullock	312579	6296676	
9891/7	D01(A) Front Gate	313290	6297176	Full
9891/8	D11 Goldstien	312034	6294213	Minor algae
9891/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 24/11/2020.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10059

Date Issued: 18/12/2020 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 11/12/2020

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	13/11/2020 10:14	11/12/2020 08:29	10059/1	Dust	
D10 Hearses Rd	13/11/2020 15:16	11/12/2020 08:56	10059/2	Dust	
D06 School	13/11/2020 09:20	11/12/2020 09:15	10059/3	Dust	
D05 Bund	13/11/2020 10:05	11/12/2020 10:48	10059/4	Dust	
D04 Rehab	13/11/2020 09:44	11/12/2020 9:43	10059/5	Dust	
D07 Mullock	13/11/2020 09:52	11/12/2020 10:20	10059/6	Dust	
D01(A) Front Gate	13/11/2020 09:26	11/12/2020 09:21	10059/7	Dust	
D11 Goldstien	13/11/2020 15:08	11/12/2020 08:44	10059/8	Dust	
D12 Ram	13/11/2020 10:36	11/12/2020 9:06	10059/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by: Lisa Thomson
Signatory

Results have been approved and report finalised on 18/12/2020.

Test Report Number: 10059

Date Issued: 18/12/2020 Revision No: 00

Results

Ambient Air	Method	Units	10059/1 D08&9 Hitchcock Rd Olive Grove 11/12/2020	10059/2 D10 Hearses Rd 11/12/2020	10059/3 D06 School 11/12/2020	10059/4 D05 Bund 11/12/2020	10059/5 D04 Rehab 11/12/2020
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.2	0.7	1.3	**4.4**	1.1
Ash	AS 3580.10.1	g/m2/mth	0.9	0.6	1.3	3.8	0.9
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.1	<0.1	0.6	0.2
Calculated Rain	AS 3580.10.1	mm	43	45	39	42	43

Ambient Air	Method	Units	10059/6 D07 Mullock 11/12/2020	10059/7 D01(A) Front Gate 11/12/2020	10059/8 D11 Goldstien 11/12/2020	10059/9 D12 Ram 11/12/2020
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.0	**5.2**	1.3	0.9
Ash	AS 3580.10.1	g/m2/mth	1.0	4.4	0.7	0.7
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	0.8	0.6	0.2
Calculated Rain	AS 3580.10.1	mm	42	44	49	45

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

Results in Bold indicate an exceedance of prescribed limit as set out in relevent EPL.
When considering the pass or fail of tests against limits,
the measurement of uncertainty of each parameter must be considered.

Sampling Report Number: 10059

Date Issued: 18/12/2020 Revision No: 00

Sampling Conditions: Cloudy 16°-18°C

Lab ID	Client Sample Reference	Licence Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10059/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	11/12/2020 08:29	AS3580.10.1	CuSO4
10059/2	D10 Hearses Rd		D.Walker	11/12/2020 08:56	AS3580.10.1	CuSO4
10059/3	D06 School		D.Walker	11/12/2020 09:15	AS3580.10.1	CuSO4
10059/4	D05 Bund		D.Walker	11/12/2020 10:48	AS3580.10.1	CuSO4
10059/5	D04 Rehab		D.Walker	11/12/2020 9:43	AS3580.10.1	CuSO4
10059/6	D07 Mullock		D.Walker	11/12/2020 10:20	AS3580.10.1	CuSO4
10059/7	D01(A) Front Gate		D.Walker	11/12/2020 09:21	AS3580.10.1	CuSO4
10059/8	D11 Goldstien		D.Walker	11/12/2020 08:44	AS3580.10.1	CuSO4
10059/9	D12 Ram		D.Walker	11/12/2020 9:06	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10059/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
10059/2	D10 Hearses Rd	312538	6294576	
10059/3	D06 School	313518	6296537	Minor vegetation
10059/4	D05 Bund	313160	6296838	Minor vegetation
10059/5	D04 Rehab	312385	6296932	
10059/6	D07 Mullock	312579	6296676	
10059/7	D01(A) Front Gate	313290	6297176	Minor sand
10059/8	D11 Goldstien	312034	6294213	Minor vegetation
10059/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 18/12/2020.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
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P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10204

Date Issued: 15/01/2021 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

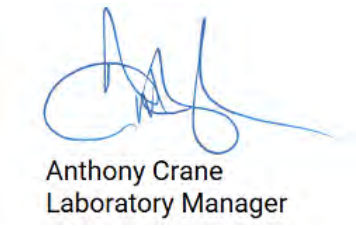
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 8/01/2021

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	11/12/2020 08:29	08/01/2021 10:14	10204/1	Dust	
D10 Hearses Rd	11/12/2020 08:56	08/01/2021 10:51	10204/2	Dust	
D06 School	11/12/2020 09:15	08/01/2021 10:07	10204/3	Dust	
D05 Bund	11/12/2020 10:48	08/01/2021 09:59	10204/4	Dust	
D04 Rehab	11/12/2020 09:43	08/01/2021 09:33	10204/5	Dust	
D07 Mullock	11/12/2020 10:20	08/01/2021 09:43	10204/6	Dust	
D01(A) Front Gate	11/12/2020 09:21	08/01/2021 09:19	10204/7	Dust	
D11 Goldstien	11/12/2020 08:44	08/01/2021 14:29	10204/8	Dust	
D12 Ram	11/12/2020 09:06	08/01/2021 10:41	10204/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 15/01/2021.

Test Report Number: 10204

Date Issued: 15/01/2021 Revision No: 00

Results

Ambient Air	Method	Units	10204/1 D08&9 Hitchcock Rd Olive Grove 8/01/2021	10204/2 D10 Hearses Rd 8/01/2021	10204/3 D06 School 8/01/2021	10204/4 D05 Bund 8/01/2021	10204/5 D04 Rehab 8/01/2021
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.4	2.9	1.0	1.3	0.5
Ash	AS 3580.10.1	g/m2/mth	0.7	1.3	0.4	0.8	0.4
Combustible Matter	AS 3580.10.1	g/m2/mth	0.7	1.6	0.6	0.5	0.1
Calculated Rain	AS 3580.10.1	mm	155	144	149	157	148

Ambient Air	Method	Units	10204/6 D07 Mullock 8/01/2021	10204/7 D01(A) Front Gate 8/01/2021	10204/8 D11 Goldstien 8/01/2021	10204/9 D12 Ram 8/01/2021
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	**5.5**	1.2	0.7
Ash	AS 3580.10.1	g/m2/mth	0.5	4.9	0.3	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.6	0.9	0.4
Calculated Rain	AS 3580.10.1	mm	150	115	142	146

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

Please note: Results **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests against guidelines,
the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

Sampling Report Number: 10204

Date Issued: 15/01/2021 Revision No: 00

Sampling Conditions: Cloudy 15°- 20°C

Lab ID	Client Sample Reference	Licence Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10204/1	D08&9 Hitchcock Rd Olive Grove		T.Walker	08/01/2021 10:14	AS3580.10.1	CuSO4
10204/2	D10 Hearses Rd		T.Walker	08/01/2021 10:51	AS3580.10.1	CuSO4
10204/3	D06 School		T.Walker	08/01/2021 10:07	AS3580.10.1	CuSO4
10204/4	D05 Bund		T.Walker	08/01/2021 09:59	AS3580.10.1	CuSO4
10204/5	D04 Rehab		T.Walker	08/01/2021 09:33	AS3580.10.1	CuSO4
10204/6	D07 Mullock		T.Walker	08/01/2021 09:43	AS3580.10.1	CuSO4
10204/7	D01(A) Front Gate		T.Walker	08/01/2021 09:19	AS3580.10.1	CuSO4
10204/8	D11 Goldstien		T.Walker	08/01/2021 14:29	AS3580.10.1	CuSO4
10204/9	D12 Ram		T.Walker	08/01/2021 10:41	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10204/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Minor insects
10204/2	D10 Hearses Rd	312538	6294576	Minor algae
10204/3	D06 School	313518	6296537	Minor vegetation
10204/4	D05 Bund	313160	6296838	Minor insects
10204/5	D04 Rehab	312385	6296932	
10204/6	D07 Mullock	312579	6296676	Minor insects
10204/7	D01(A) Front Gate	313290	6297176	Full, major sand
10204/8	D11 Goldstien	312034	6294213	
10204/9	D12 Ram	311750	6294159	Minor insects

Sampling procedures have been approved and report finalised on 15/01/2021.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10329

Date Issued: 12/02/2021 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 5/02/2021

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	08/01/2021 10:14	05/02/2021 10:25	10329/1	Dust	
D10 Hearses Rd	08/01/2021 10:51	05/02/2021 10:56	10329/2	Dust	
D06 School	08/01/2021 10:07	05/02/2021 09:29	10329/3	Dust	
D05 Bund	08/01/2021 09:59	05/02/2021 09:38	10329/4	Dust	
D04 Rehab	08/01/2021 09:33	05/02/2021 10:04	10329/5	Dust	
D07 Mullock	08/01/2021 09:43	05/02/2021 10:16	10329/6	Dust	
D01(A) Front Gate	08/01/2021 09:19	05/02/2021 09:47	10329/7	Dust	
D11 Goldstien	08/01/2021 14:29	05/02/2021 14:41	10329/8	Dust	
D12 Ram	08/01/2021 10:41	05/02/2021 10:46	10329/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)

Approved by: Lisa Thomson
Signatory

Results have been approved and report finalised on 12/02/2021.

Test Report Number: 10329

Date Issued: 12/02/2021 Revision No: 00

Results

Ambient Air	Method	Units	10329/1 D08&9 Hitchcock Rd Olive Grove 5/02/2021	10329/2 D10 Hearses Rd 5/02/2021	10329/3 D06 School 5/02/2021	10329/4 D05 Bund 5/02/2021	10329/5 D04 Rehab 5/02/2021
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	**5.2**	1.2	3.1	1.1
Ash	AS 3580.10.1	g/m2/mth	0.5	4.4	0.5	2.3	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.8	0.7	0.8	0.6
Calculated Rain	AS 3580.10.1	mm	56	53	57	57	56

Ambient Air	Method	Units	10329/6 D07 Mullock 5/02/2021	10329/7 D01(A) Front Gate 5/02/2021	10329/8 D11 Goldstien 5/02/2021	10329/9 D12 Ram 5/02/2021
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.5	2.8	1.1	0.7
Ash	AS 3580.10.1	g/m2/mth	0.9	2.2	0.4	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.6	0.6	0.7	0.4
Calculated Rain	AS 3580.10.1	mm	57	58	50	52

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

Please note: Results **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests against guidelines,
the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

Sampling Report Number: 10329

Date Issued: 12/02/2021 Revision No: 00

Sampling Conditions: Fine 23°-31°C

Lab ID	Client Sample Reference	Licence Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10329/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	05/02/2021 10:25	AS3580.10.1	CuSO4
10329/2	D10 Hearses Rd		D.Walker	05/02/2021 10:56	AS3580.10.1	CuSO4
10329/3	D06 School		D.Walker	05/02/2021 09:29	AS3580.10.1	CuSO4
10329/4	D05 Bund		D.Walker	05/02/2021 09:38	AS3580.10.1	CuSO4
10329/5	D04 Rehab		D.Walker	05/02/2021 10:04	AS3580.10.1	CuSO4
10329/6	D07 Mullock		D.Walker	05/02/2021 10:16	AS3580.10.1	CuSO4
10329/7	D01(A) Front Gate		D.Walker	05/02/2021 09:47	AS3580.10.1	CuSO4
10329/8	D11 Goldstien		D.Walker	05/02/2021 14:41	AS3580.10.1	CuSO4
10329/9	D12 Ram		D.Walker	05/02/2021 10:46	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10329/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
10329/2	D10 Hearses Rd	312538	6294576	Minor sand, vegetation, algae. Adj paddock dug up and replanted
10329/3	D06 School	313518	6296537	Insects
10329/4	D05 Bund	313160	6296838	Vegetation, minor algae
10329/5	D04 Rehab	312385	6296932	Insects
10329/6	D07 Mullock	312579	6296676	Minor insects
10329/7	D01(A) Front Gate	313290	6297176	Minor insects, sand
10329/8	D11 Goldstien	312034	6294213	Minor vegetation
10329/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 12/02/2021.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10528

Date Issued: 16/03/2021 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

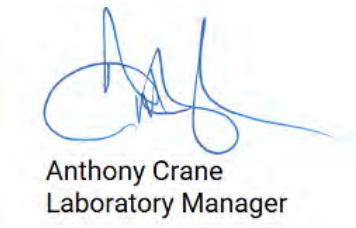
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 9/03/2021

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	05/02/2021 10:25	09/03/2021 11:03	10528/1	Dust	
D10 Hearses Rd	05/02/2021 10:56	09/03/2021 11:40	10528/2	Dust	
D06 School	05/02/2021 09:29	09/03/2021 09:55	10528/3	Dust	
D05 Bund	05/02/2021 09:38	09/03/2021 10:08	10528/4	Dust	
D04 Rehab	05/02/2021 10:04	09/03/2021 10:48	10528/5	Dust	
D07 Mullock	05/02/2021 10:16	09/03/2021 10:34	10528/6	Dust	
D01(A) Front Gate	05/02/2021 09:47	09/03/2021 10:21	10528/7	Dust	
D11 Goldstien	05/02/2021 14:41	09/03/2021 15:16	10528/8	Dust	
D12 Ram	05/02/2021 10:46	09/03/2021 11:29	10528/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 16/03/2021.

Test Report Number: 10528

Date Issued: 16/03/2021 Revision No: 00

Results

Ambient Air	Method	Units	10528/1 D08&9 Hitchcock Rd Olive Grove 9/03/2021	10528/2 D10 Hearses Rd 9/03/2021	10528/3 D06 School 9/03/2021	10528/4 D05 Bund 9/03/2021	10528/5 D04 Rehab 9/03/2021
Number of Days	AS 3580.10.1	days	32	32	32	32	32
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.5	2.2	1.8	1.0	0.5
Ash	AS 3580.10.1	g/m2/mth	0.4	1.4	1.1	0.8	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.8	0.7	0.2	0.2
Calculated Rain	AS 3580.10.1	mm	67	61	58	57	54

Ambient Air	Method	Units	10528/6 D07 Mullock 9/03/2021	10528/7 D01(A) Front Gate 9/03/2021	10528/8 D11 Goldstien 9/03/2021	10528/9 D12 Ram 9/03/2021
Number of Days	AS 3580.10.1	days	32	32	32	32
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.5	1.4	0.5	0.4
Ash	AS 3580.10.1	g/m2/mth	0.4	1.1	0.2	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.3	0.3	0.2
Calculated Rain	AS 3580.10.1	mm	55	55	63	67

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

Please note: Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests against guidelines,
the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

Sampling Report Number: 10528

Date Issued: 16/03/2021 Revision No: 00

Sampling Conditions: Cloudy 23°-29°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10528/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	09/03/2021 11:03	AS3580.10.1	CuSO4
10528/2	D10 Hearses Rd		D.Walker	09/03/2021 11:40	AS3580.10.1	CuSO4
10528/3	D06 School		D.Walker	09/03/2021 09:55	AS3580.10.1	CuSO4
10528/4	D05 Bund		D.Walker	09/03/2021 10:08	AS3580.10.1	CuSO4
10528/5	D04 Rehab		D.Walker	09/03/2021 10:48	AS3580.10.1	CuSO4
10528/6	D07 Mullock		D.Walker	09/03/2021 10:34	AS3580.10.1	CuSO4
10528/7	D01(A) Front Gate		D.Walker	09/03/2021 10:21	AS3580.10.1	CuSO4
10528/8	D11 Goldstien		D.Walker	09/03/2021 15:16	AS3580.10.1	CuSO4
10528/9	D12 Ram		D.Walker	09/03/2021 11:29	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10528/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
10528/2	D10 Hearses Rd	312538	6294576	Insects, algae, bird droppings in funnel
10528/3	D06 School	313518	6296537	Minor sand, minor vegetation, minor insects
10528/4	D05 Bund	313160	6296838	Minor vegetation
10528/5	D04 Rehab	312385	6296932	
10528/6	D07 Mullock	312579	6296676	
10528/7	D01(A) Front Gate	313290	6297176	Minor dust, paddock being filled
10528/8	D11 Goldstien	312034	6294213	Minor vegetation
10528/9	D12 Ram	311750	6294159	Minor insects

Sampling procedures have been approved and report finalised on 16/03/2021.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10754

Date Issued: 15/04/2021 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

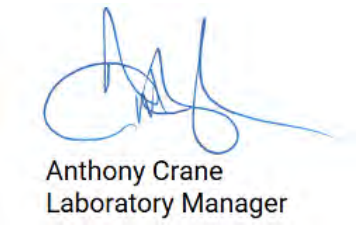
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 6/04/2021

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	09/03/2021 11:03	06/04/2021 10:45	10754/1	Dust	
D10 Hearses Rd	09/03/2021 11:40	06/04/2021 11:09	10754/2	Dust	
D06 School	09/03/2021 09:55	06/04/2021 09:24	10754/3	Dust	
D05 Bund	09/03/2021 10:08	06/04/2021 09:36	10754/4	Dust	
D04 Rehab	09/03/2021 10:48	06/04/2021 10:04	10754/5	Dust	
D07 Mullock	09/03/2021 10:34	06/04/2021 10:18	10754/6	Dust	
D01(A) Front Gate	09/03/2021 10:21	06/04/2021 09:45	10754/7	Dust	
D11 Goldstien	09/03/2021 15:16	06/04/2021 14:17	10754/8	Dust	High foliage encroaching on capture zone
D12 Ram	09/03/2021 11:29	06/04/2021 10:35	10754/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 15/04/2021.

Test Report Number: 10754

Date Issued: 15/04/2021 Revision No: 00

Results

Ambient Air	Method	Units	10754/1 D08&9 Hitchcock Rd Olive Grove 6/04/2021	10754/2 D10 Hearses Rd 6/04/2021	10754/3 D06 School 6/04/2021	10754/4 D05 Bund 6/04/2021	10754/5 D04 Rehab 6/04/2021
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.2	0.9	1.4	1.6	0.5
Ash	AS 3580.10.1	g/m2/mth	0.2	0.4	0.5	1.3	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	0.5	0.9	0.3	<0.1
Calculated Rain	AS 3580.10.1	mm	285	287	287	288	285

Ambient Air	Method	Units	10754/6 D07 Mullock 6/04/2021	10754/7 D01(A) Front Gate 6/04/2021	10754/8 D11 Goldstien 6/04/2021	10754/9 D12 Ram 6/04/2021
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.4	**7.5**	0.5	0.2
Ash	AS 3580.10.1	g/m2/mth	0.3	6.9	0.2	0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.6	0.3	0.1
Calculated Rain	AS 3580.10.1	mm	287	117	287	288

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests against guidelines,
the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 10754

Date Issued: 15/04/2021 Revision No: 00

Sampling Conditions: Intermittent Showers 20°-23°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10754/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	06/04/2021 10:45	AS3580.10.1	CuSO4
10754/2	D10 Hearses Rd		D.Walker	06/04/2021 11:09	AS3580.10.1	CuSO4
10754/3	D06 School		D.Walker	06/04/2021 09:24	AS3580.10.1	CuSO4
10754/4	D05 Bund		D.Walker	06/04/2021 09:36	AS3580.10.1	CuSO4
10754/5	D04 Rehab		D.Walker	06/04/2021 10:04	AS3580.10.1	CuSO4
10754/6	D07 Mullock		D.Walker	06/04/2021 10:18	AS3580.10.1	CuSO4
10754/7	D01(A) Front Gate		D.Walker	06/04/2021 09:45	AS3580.10.1	CuSO4
10754/8	D11 Goldstien		D.Walker	06/04/2021 14:17	AS3580.10.1	CuSO4
10754/9	D12 Ram		D.Walker	06/04/2021 10:35	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10754/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Full
10754/2	D10 Hearses Rd	312538	6294576	Full
10754/3	D06 School	313518	6296537	Full, insects
10754/4	D05 Bund	313160	6296838	Full
10754/5	D04 Rehab	312385	6296932	Full
10754/6	D07 Mullock	312579	6296676	Full
10754/7	D01(A) Front Gate	313290	6297176	Full, sand, minor bird droppings
10754/8	D11 Goldstien	312034	6294213	Full
10754/9	D12 Ram	311750	6294159	Full

Sampling procedures have been approved and report finalised on 15/04/2021.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10861

Date Issued: 11/05/2021 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

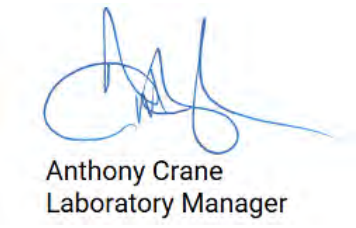
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 4/05/2021

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	06/04/2021 10:45	04/05/2021 10:34	10861/1	Dust	
D10 Hearses Rd	06/04/2021 11:09	04/05/2021 10:50	10861/2	Dust	
D06 School	06/04/2021 09:24	04/05/2021 09:15	10861/3	Dust	
D05 Bund	06/04/2021 09:36	04/05/2021 10:08	10861/4	Dust	
D04 Rehab	06/04/2021 10:04	04/05/2021 09:45	10861/5	Dust	
D07 Mullock	06/04/2021 10:18	04/05/2021 09:55	10861/6	Dust	
D01(A) Front Gate	06/04/2021 09:45	04/05/2021 09:28	10861/7	Dust	
D11 Goldstien	06/04/2021 14:17	04/05/2021 14:41	10861/8	Dust	Concreted dust gauge stand today
D12 Ram	06/04/2021 10:35	04/05/2021 10:22	10861/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 11/05/2021.

Test Report Number: 10861

Date Issued: 11/05/2021 Revision No: 00

Results

Ambient Air	Method	Units	10861/1 D08&9 Hitchcock Rd Olive Grove 4/05/2021	10861/2 D10 Hearses Rd 4/05/2021	10861/3 D06 School 4/05/2021	10861/4 D05 Bund 4/05/2021	10861/5 D04 Rehab 4/05/2021
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	3.2	1.5	1.2	1.0
Ash	AS 3580.10.1	g/m2/mth	0.3	1.7	0.6	0.7	0.4
Combustible Matter	AS 3580.10.1	g/m2/mth	0.5	1.5	0.9	0.5	0.6
Calculated Rain	AS 3580.10.1	mm	27	24	16	13	11

Ambient Air	Method	Units	10861/6 D07 Mullock 4/05/2021	10861/7 D01(A) Front Gate 4/05/2021	10861/8 D11 Goldstien 4/05/2021	10861/9 D12 Ram 4/05/2021
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.9	1.9	1.3	0.2
Ash	AS 3580.10.1	g/m2/mth	0.5	1.5	0.8	<0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	0.4	0.5	0.2
Calculated Rain	AS 3580.10.1	mm	12	13	20	23

Equipment Costs & Activities	Method	Units	10861/8 D11 Goldstien 4/05/2021
Relocate Dust Gauge			1

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 10861

Date Issued: 11/05/2021 Revision No: 00

Sampling Conditions: Raining 15°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10861/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	04/05/2021 10:34	AS3580.10.1	CuSO4
10861/2	D10 Hearses Rd		D.Walker	04/05/2021 10:50	AS3580.10.1	CuSO4
10861/3	D06 School		D.Walker	04/05/2021 09:15	AS3580.10.1	CuSO4
10861/4	D05 Bund		D.Walker	04/05/2021 10:08	AS3580.10.1	CuSO4
10861/5	D04 Rehab		D.Walker	04/05/2021 09:45	AS3580.10.1	CuSO4
10861/6	D07 Mullock		D.Walker	04/05/2021 09:55	AS3580.10.1	CuSO4
10861/7	D01(A) Front Gate		D.Walker	04/05/2021 09:28	AS3580.10.1	CuSO4
10861/8	D11 Goldstien		D.Walker	04/05/2021 14:41	AS3580.10.1	CuSO4
10861/9	D12 Ram		D.Walker	04/05/2021 10:22	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10861/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
10861/2	D10 Hearses Rd	312538	6294576	Bird droppings, algae
10861/3	D06 School	313518	6296537	Insects
10861/4	D05 Bund	313160	6296838	
10861/5	D04 Rehab	312385	6296932	
10861/6	D07 Mullock	312579	6296676	
10861/7	D01(A) Front Gate	313290	6297176	
10861/8	D11 Goldstien	312034	6294213	Minor insects
10861/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 11/05/2021.
Where method is "unknown" sampling procedures are not endorsed

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10957

Date Issued: 8/06/2021 Revision Number: 00

Site/Job: Dixon Maroota - Dusts

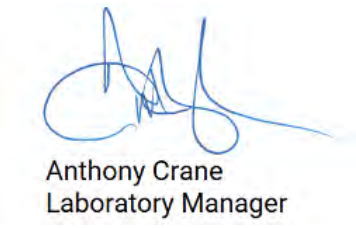
Client: Dixon Sand (No.1) Pty Ltd
Address PO Box 4019
PITT TOWN NSW 2756
Contact David Dixon

The following 9 sample(s) were received on 1/06/2021

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	04/05/2021 10:34	01/06/2021 11:47	10957/1	Dust	
D10 Hearses Rd	04/05/2021 10:50	01/06/2021 11:24	10957/2	Dust	
D06 School	04/05/2021 09:15	01/06/2021 10:37	10957/3	Dust	
D05 Bund	04/05/2021 10:08	01/06/2021 10:49	10957/4	Dust	
D04 Rehab	04/05/2021 09:45	01/06/2021 11:13	10957/5	Dust	
D07 Mullock	04/05/2021 09:55	01/06/2021 11:23	10957/6	Dust	
D01(A) Front Gate	04/05/2021 09:28	01/06/2021 10:57	10957/7	Dust	
D11 Goldstien	04/05/2021 14:41	01/06/2021 16:28	10957/8	Dust	
D12 Ram	04/05/2021 10:22	01/06/2021 11:39	10957/9	Dust	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 8/06/2021.

Test Report Number: 10957

Date Issued: 8/06/2021 Revision No: 00

Results

Ambient Air	Method	Units	10957/1 D08&9 Hitchcock Rd Olive Grove 1/06/2021	10957/2 D10 Hearses Rd 1/06/2021	10957/3 D06 School 1/06/2021	10957/4 D05 Bund 1/06/2021	10957/5 D04 Rehab 1/06/2021
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.4	2.7	0.5	0.5	2.4
Ash	AS 3580.10.1	g/m2/mth	0.2	1.8	0.3	0.4	1.6
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	0.9	0.2	0.1	0.8
Calculated Rain	AS 3580.10.1	mm	73	75	77	76	77

Ambient Air	Method	Units	10957/6 D07 Mullock 1/06/2021	10957/7 D01(A) Front Gate 1/06/2021	10957/8 D11 Goldstien 1/06/2021	10957/9 D12 Ram 1/06/2021
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.3	**4.3**	0.8	0.3
Ash	AS 3580.10.1	g/m2/mth	0.2	4.1	0.2	0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.2	0.6	0.2
Calculated Rain	AS 3580.10.1	mm	74	85	69	73

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 10957

Date Issued: 8/06/2021 Revision No: 00

Sampling Conditions: Cloudy 13°-17°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10957/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	01/06/2021 11:47	AS3580.10.1	CuSO4
10957/2	D10 Hearses Rd		D.Walker	01/06/2021 11:24	AS3580.10.1	CuSO4
10957/3	D06 School		D.Walker	01/06/2021 10:37	AS3580.10.1	CuSO4
10957/4	D05 Bund		D.Walker	01/06/2021 10:49	AS3580.10.1	CuSO4
10957/5	D04 Rehab		D.Walker	01/06/2021 11:13	AS3580.10.1	CuSO4
10957/6	D07 Mullock		D.Walker	01/06/2021 11:23	AS3580.10.1	CuSO4
10957/7	D01(A) Front Gate		D.Walker	01/06/2021 10:57	AS3580.10.1	CuSO4
10957/8	D11 Goldstien		D.Walker	01/06/2021 16:28	AS3580.10.1	CuSO4
10957/9	D12 Ram		D.Walker	01/06/2021 11:39	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
10957/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
10957/2	D10 Hearses Rd	312538	6294576	Bird droppings, minor vegetation
10957/3	D06 School	313518	6296537	Minor insects
10957/4	D05 Bund	313160	6296838	
10957/5	D04 Rehab	312385	6296932	Algae
10957/6	D07 Mullock	312579	6296676	
10957/7	D01(A) Front Gate	313290	6297176	Minor sand
10957/8	D11 Goldstien	312034	6294213	Minor vegetation
10957/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 8/06/2021.
Where method is "unknown" sampling procedures are not endorsed

Appendix B – PM10, TSP and Weather Station Reports

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

July 2020
Amendment 1

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for July 2020 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from the 1st July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for July 2020.

Approximately 100% of TEOM data was recovered for July 2020.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

A quarterly calibration was undertaken in May 2020 and the next calibration is scheduled for August 2020. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for June 2020 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/07/2020	9.7	9.7	24.3	24.3
2/07/2020	14.1	11.9	35.3	29.8
3/07/2020	15.5	13.1	38.8	32.8
4/07/2020	15.5	13.1	38.8	32.8
5/07/2020	15.5	13.1	38.8	32.8
6/07/2020	15.5	13.1	38.8	32.8
7/07/2020	15.5	13.1	38.8	32.8
8/07/2020	15.5	13.1	38.8	32.8
9/07/2020	15.5	13.1	38.8	32.8
10/07/2020	15.5	13.1	38.8	32.8
11/07/2020	15.5	13.1	38.8	32.8
12/07/2020	15.5	13.1	38.8	32.8
13/07/2020	15.5	13.1	38.8	32.8
14/07/2020	15.5	13.1	38.8	32.8
15/07/2020	15.5	13.1	38.8	32.8
16/07/2020	15.5	13.1	38.8	32.8
17/07/2020	15.5	13.1	38.8	32.8
18/07/2020	15.5	13.1	38.8	32.8
19/07/2020	15.5	13.1	38.8	32.8
20/07/2020	15.5	13.1	38.8	32.8
21/07/2020	15.5	13.1	38.8	32.8
22/07/2020	15.5	13.1	38.8	32.8
23/07/2020	15.5	13.1	38.8	32.8
24/07/2020	15.5	13.1	38.8	32.8
25/07/2020	15.5	13.1	38.8	32.8
26/07/2020	15.5	13.1	38.8	32.8
27/07/2020	15.5	13.1	38.8	32.8
28/07/2020	15.5	13.1	38.8	32.8
29/07/2020	15.5	13.1	38.8	32.8
30/07/2020	15.5	13.1	38.8	32.8
31/07/2020	15.5	13.1	38.8	32.8

*Calculated from PM10

**Calculated from PM10 Annual Average

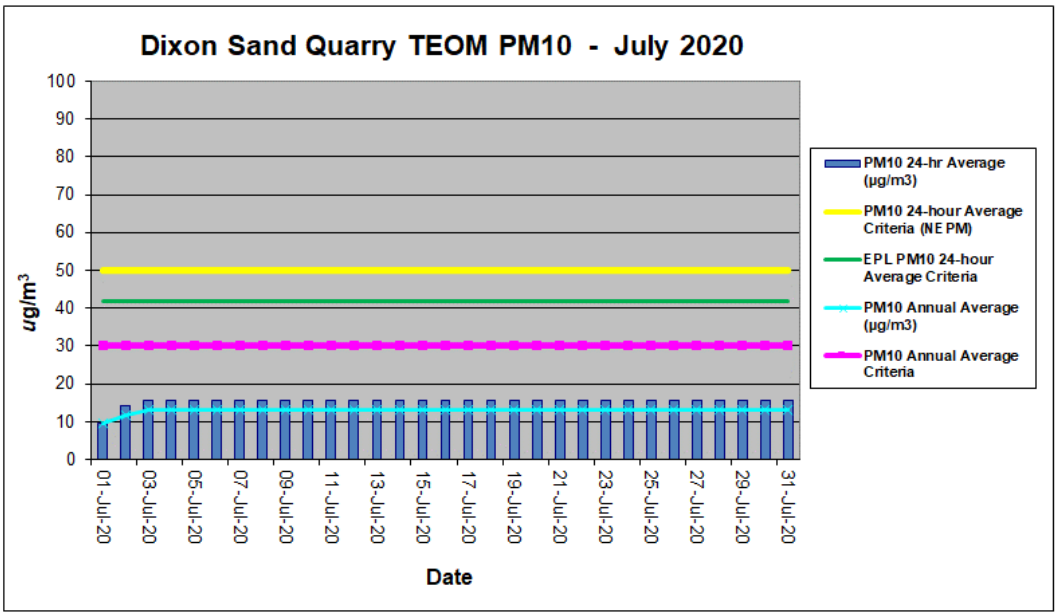


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

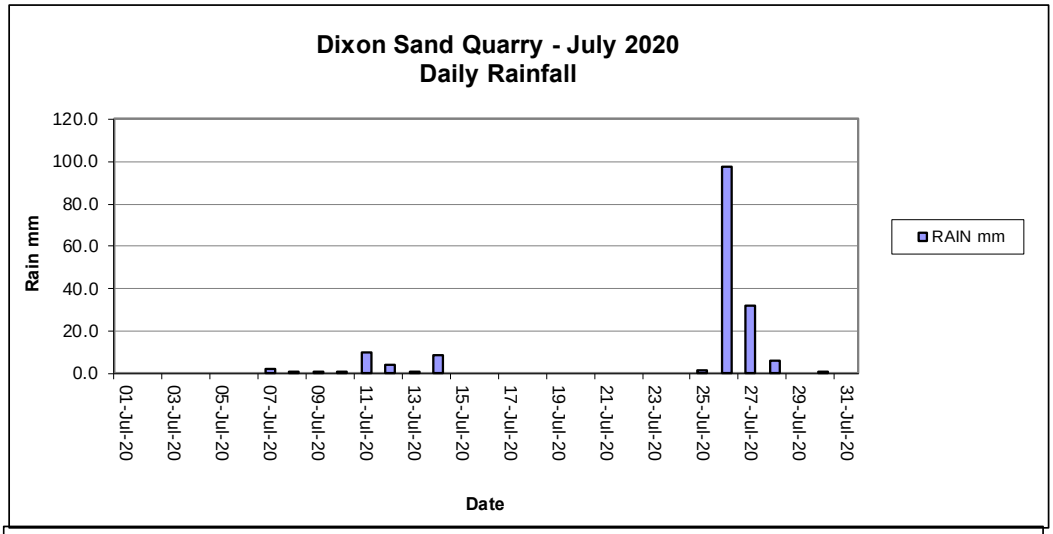
The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

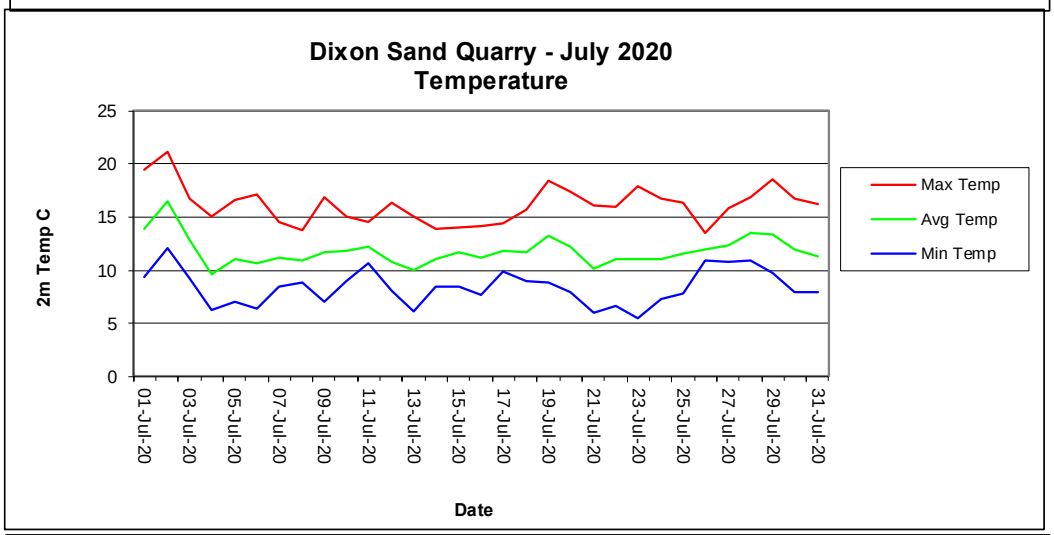
A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for July 2020

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/07/2020	9.3	13.9	19.4	0.0	0.7	6.0	12.8	46.2	76.6	100.0	996.4	999.1	1001.5
2/07/2020	12.1	16.5	21.1	0.0	0.9	8.4	28.0	42.3	96.1	100.0	993.4	995.3	996.5
3/07/2020	9.2	12.8	16.8	0.0	0.0	3.4	12.6	35.8	57.7	100.0	996.4	997.7	999.8
4/07/2020	6.2	9.6	15.1	0.0	0.2	3.7	17.8	32.4	56.6	90.4	995.6	997.9	999.7
5/07/2020	7.0	11.0	16.6	0.0	0.1	2.9	15.1	39.1	58.0	75.8	998.7	1000.7	1004.1
6/07/2020	6.4	10.7	17.1	0.0	0.0	2.4	9.1	44.9	70.8	92.6	1003.8	1005.5	1007.4
7/07/2020	8.4	11.2	14.6	1.8	0.0	3.4	11.0	51.1	78.8	100.0	1006.3	1007.8	1009.1
8/07/2020	8.9	11.0	13.7	0.2	0.2	2.3	8.3	81.4	99.6	100.0	1007.5	1008.6	1010.2
9/07/2020	7.0	11.7	16.9	0.2	0.0	2.5	11.1	72.8	99.4	100.0	1006.1	1007.7	1009.9
10/07/2020	9.0	11.9	15.0	0.4	0.1	2.2	7.1	86.2	99.8	100.0	1000.2	1003.9	1006.9
11/07/2020	10.7	12.1	14.6	9.8	0.2	2.8	9.2	99.8	100.0	100.0	992.7	995.6	1000.1
12/07/2020	8.1	10.8	16.4	3.8	0.3	2.9	11.8	90.1	99.9	100.0	993.4	994.6	996.4
13/07/2020	6.1	10.0	15.0	0.6	0.0	2.3	16.0	99.2	100.0	100.0	995.3	996.3	997.7
14/07/2020	8.4	11.0	13.9	8.6	0.4	10.1	32.2	81.1	96.2	100.0	993.8	996.1	998.3
15/07/2020	8.5	11.7	14.0	0.0	0.2	8.9	25.1	73.3	89.2	99.2	994.9	996.4	997.4
16/07/2020	7.7	11.2	14.1	0.0	1.0	6.8	18.2	57.1	70.2	99.2	994.7	996.0	997.5
17/07/2020	9.9	11.8	14.4	0.0	0.4	5.6	24.8	65.1	74.6	100.0	996.9	998.9	1000.9
18/07/2020	9.0	11.7	15.7	0.0	0.2	3.3	8.7	59.3	92.0	100.0	998.0	999.5	1001.3
19/07/2020	8.9	13.2	18.4	0.0	0.3	5.1	15.8	51.3	85.7	99.9	992.7	995.0	998.0
20/07/2020	8.0	12.2	17.4	0.0	0.1	3.8	13.7	41.6	66.1	86.1	992.9	997.1	1001.6
21/07/2020	6.0	10.2	16.1	0.0	0.1	3.3	15.9	47.0	77.6	99.3	1001.1	1004.5	1006.9
22/07/2020	6.7	11.0	16.0	0.0	0.2	2.7	9.0	51.7	82.1	99.4	1002.8	1004.8	1006.6
23/07/2020	5.5	11.1	17.9	0.0	0.0	2.1	8.0	99.2	99.9	100.0	1002.4	1003.8	1005.3
24/07/2020	7.3	11.1	16.7	0.0	0.0	2.7	10.2	100.0	100.0	100.0	1003.5	1004.9	1006.5
25/07/2020	7.8	11.6	16.4	1.4	0.0	2.1	10.4	99.9	100.0	100.0	1001.3	1003.2	1005.2
26/07/2020	10.9	11.9	13.5	97.4	0.0	5.5	32.8	100.0	100.0	100.0	980.5	992.8	1001.2
27/07/2020	10.8	12.4	15.8	31.6	0.4	7.2	26.2	99.6	100.0	100.0	977.7	979.5	982.4
28/07/2020	10.9	13.6	16.9	5.8	0.2	5.3	18.0	100.0	100.0	100.0	981.8	988.3	994.1
29/07/2020	9.8	13.4	18.6	0.0	0.0	2.5	10.1	100.0	100.0	100.0	992.9	995.4	998.5
30/07/2020	8.0	11.9	16.8	0.2	0.0	3.4	16.0	100.0	100.0	100.0	998.0	1002.1	1006.4
31/07/2020	8.0	11.3	16.2	0.0	0.2	3.9	15.8	99.5	100.0	100.0	1005.0	1006.1	1008.0
Monthly	5.5	11.8	21.1	161.8	0.0	4.2	32.8	32.4	88.0	100.0	977.7	999.2	1010.2





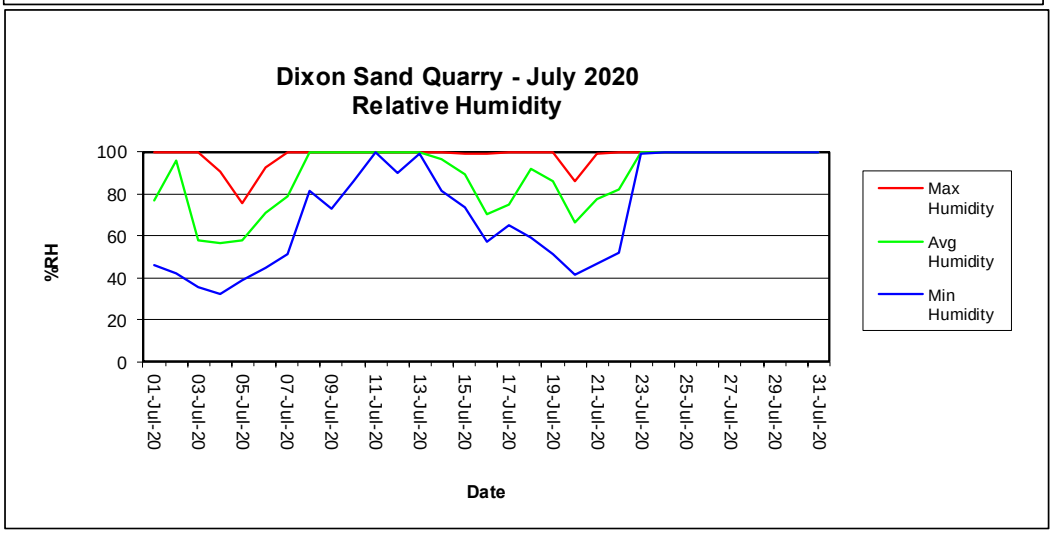


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

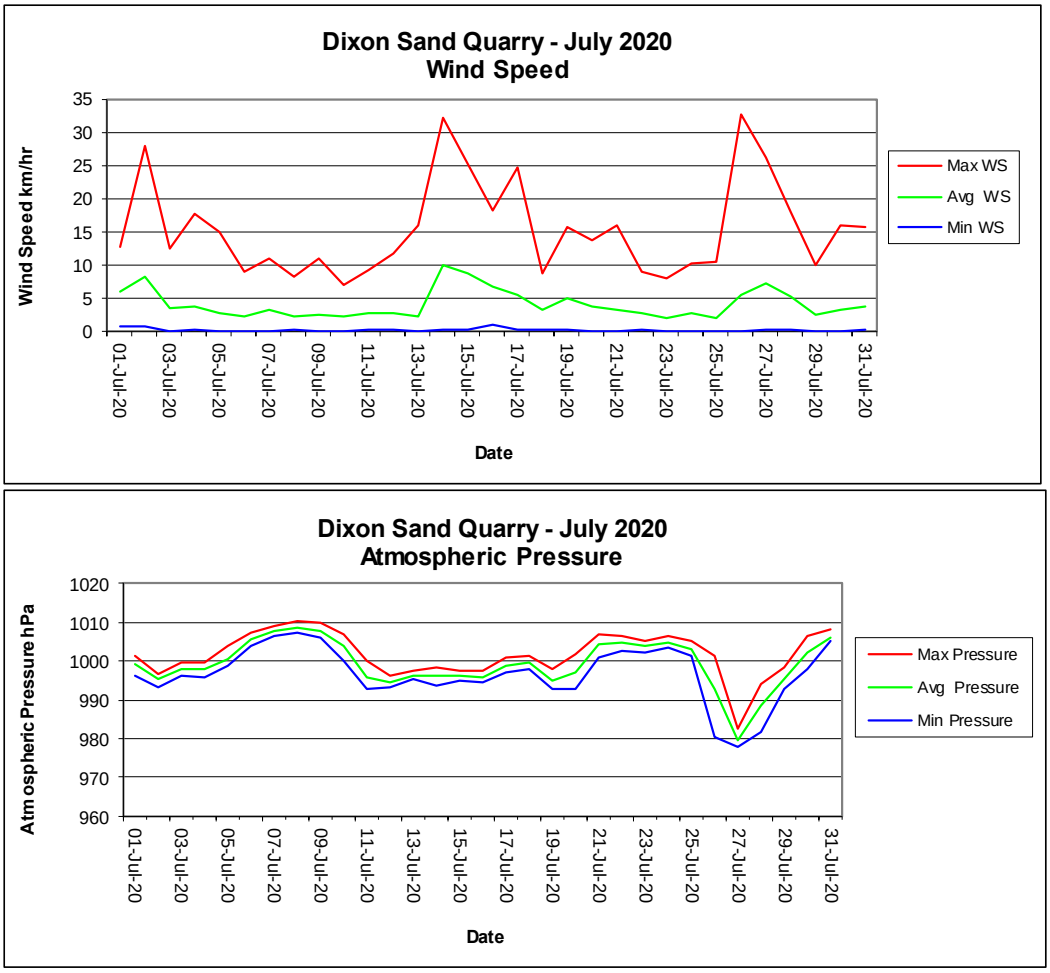
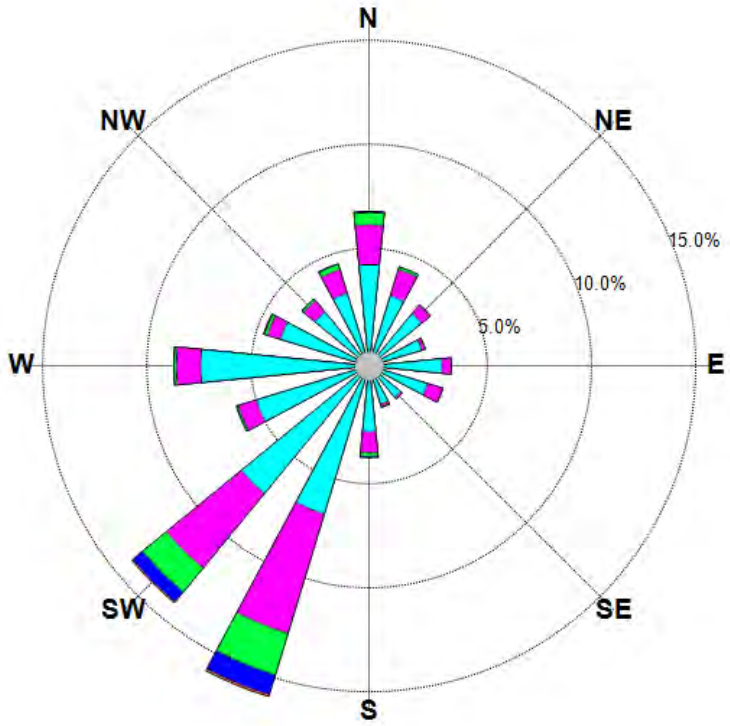


Figure 3: *Wind Speed and Atmospheric Pressure Charts*

Dixon Sand Quarry - Windrose

July 2020



Calms %: 13.4
Average Windspeed (km/h): 4.1
Maximum Windspeed (km/h): 32.8
Prevailing Wind Direction: 202.5

WIND SPEED (km/h)
- > 35 (0.0%)
- 25 - 35 (0.2%)
- 15 - 25 (1.8%)
- 10 - 15 (5.3%)
- 5 - 10 (21.6%)
- 1 - 5 (57.8%)

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

August 2020
Amendment 1

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for August 2020 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from the 1st July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for August 2020.

Approximately 100% of TEOM data was recovered for August 2020.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

A quarterly calibration was undertaken on 31 August 2020 and the next calibration is scheduled for October 2020. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for August 2020 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/08/2020	12.8	10.0	32.0	25.0
2/08/2020	13.5	10.1	33.8	25.3
3/08/2020	8.1	10.1	20.3	25.1
4/08/2020	12.6	10.1	31.5	25.3
5/08/2020	11.0	10.2	27.5	25.4
6/08/2020	11.7	10.2	29.3	25.5
7/08/2020	18.3	10.4	45.8	26.0
8/08/2020	6.2	10.3	15.5	25.8
9/08/2020	5.5	10.2	13.8	25.5
10/08/2020	11.5	10.2	28.8	25.5
11/08/2020	9.1	10.2	22.8	25.5
12/08/2020	10.7	10.2	26.8	25.5
13/08/2020	7.8	10.1	19.5	25.4
14/08/2020	14.0	10.2	35.0	25.6
15/08/2020	3.7	10.1	9.3	25.2
16/08/2020	4.7	10.0	11.8	24.9
17/08/2020	6.8	9.9	17.0	24.8
18/08/2020	6.2	9.8	15.5	24.6
19/08/2020	24.0	10.1	60.0	25.3
20/08/2020	11.8	10.1	29.5	25.4
21/08/2020	14.2	10.2	35.5	25.6
22/08/2020	8.3	10.2	20.8	25.5
23/08/2020	5.7	10.1	14.3	25.3
24/08/2020	11.8	10.1	29.5	25.3
25/08/2020	14.1	10.2	35.3	25.5
26/08/2020	13.5	10.3	33.8	25.7
27/08/2020	10.5	10.3	26.3	25.7
28/08/2020	13.3	10.3	33.3	25.8
29/08/2020	16.7	10.4	41.8	26.1
30/08/2020	16.0	10.5	40.0	26.3
31/08/2020	21.9	10.7	54.8	26.8

*Calculated from PM10

**Calculated from PM10 Annual Average

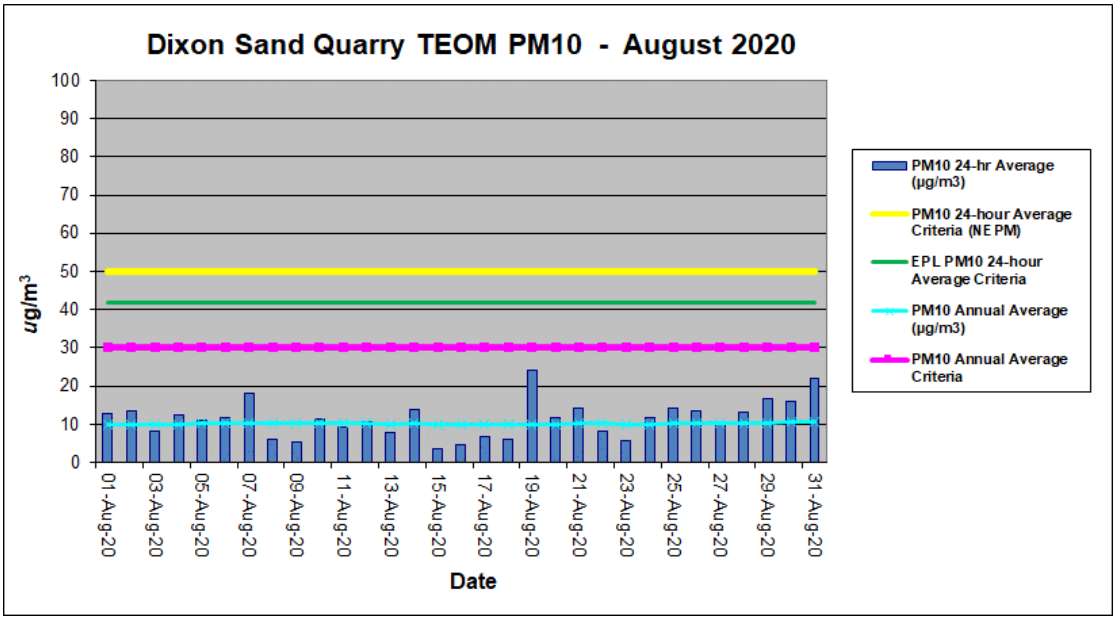


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

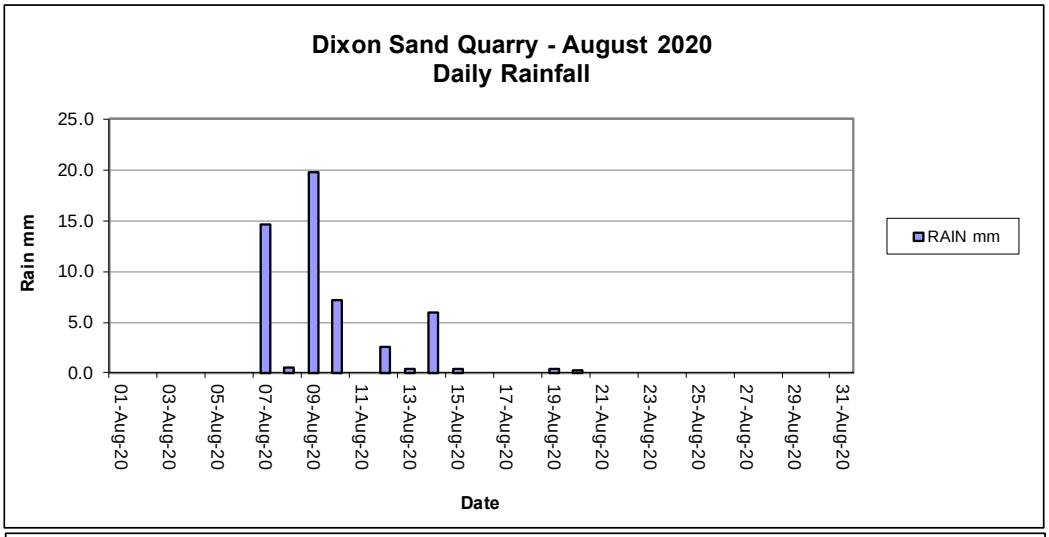
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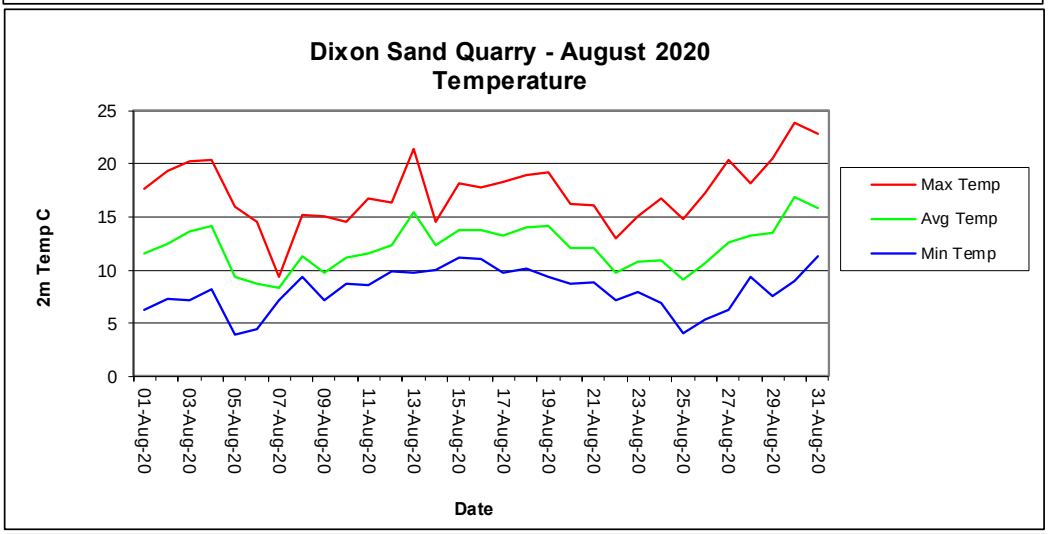
A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for August 2020

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/08/2020	6.2	11.6	17.6	0.0	0.2	4.0	14.9	99.5	100.0	100.0	1001.6	1003.9	1006.1
2/08/2020	7.3	12.5	19.3	0.0	0.1	2.4	8.5	66.1	99.5	100.0	1000.7	1002.3	1004.4
3/08/2020	7.1	13.7	20.2	0.0	0.2	3.7	11.8	49.3	88.4	100.0	993.8	996.7	1000.7
4/08/2020	8.2	14.1	20.3	0.0	0.1	5.3	19.6	50.3	83.2	99.5	987.3	990.7	993.8
5/08/2020	3.9	9.4	15.9	0.0	0.2	4.5	16.4	28.3	46.8	73.8	990.9	992.5	995.0
6/08/2020	4.4	8.8	14.5	0.0	0.2	3.5	13.6	52.0	79.0	99.5	994.3	997.3	1001.4
7/08/2020	7.1	8.3	9.3	14.6	0.2	2.6	13.3	80.4	99.8	100.0	993.7	998.2	1001.0
8/08/2020	9.3	11.3	15.2	0.6	0.0	3.3	12.2	100.0	100.0	100.0	989.4	992.0	994.1
9/08/2020	7.1	9.7	15.0	19.8	0.2	5.5	23.1	100.0	100.0	100.0	981.7	988.2	991.0
10/08/2020	8.7	11.1	14.6	7.2	0.6	6.4	22.4	99.2	100.0	100.0	988.1	995.0	999.9
11/08/2020	8.6	11.6	16.7	0.0	0.1	4.0	11.3	88.3	99.1	100.0	996.7	998.7	1000.7
12/08/2020	9.9	12.3	16.4	2.6	0.1	3.3	10.1	99.4	100.0	100.0	990.8	993.7	997.4
13/08/2020	9.7	15.5	21.4	0.4	0.1	2.9	8.7	85.8	99.7	100.0	990.9	992.9	995.5
14/08/2020	10.0	12.3	14.5	6.0	0.1	2.0	8.4	93.4	99.4	100.0	988.5	993.0	995.6
15/08/2020	11.2	13.7	18.2	0.4	0.3	3.9	14.8	100.0	100.0	100.0	984.4	986.4	988.3
16/08/2020	11.0	13.7	17.8	0.0	0.3	5.7	21.8	100.0	100.0	100.0	984.6	985.9	987.2
17/08/2020	9.8	13.3	18.3	0.0	0.2	4.3	19.5	61.1	97.6	100.0	985.5	987.1	988.7
18/08/2020	10.2	14.0	19.0	0.0	0.5	5.8	18.7	59.7	95.9	100.0	980.2	984.0	987.6
19/08/2020	9.3	14.1	19.2	0.4	0.7	8.0	50.4	27.4	80.6	100.0	971.5	976.4	980.3
20/08/2020	8.7	12.1	16.2	0.2	0.4	6.2	25.4	39.5	77.8	100.0	976.6	981.8	986.8
21/08/2020	8.8	12.1	16.1	0.0	0.2	6.5	28.0	36.5	83.2	100.0	983.4	985.5	987.3
22/08/2020	7.1	9.8	13.0	0.0	0.4	6.4	33.1	35.0	91.8	100.0	982.1	984.4	985.7
23/08/2020	8.0	10.8	15.1	0.0	0.5	6.6	21.2	33.6	64.3	99.6	983.1	987.3	992.8
24/08/2020	6.9	10.9	16.7	0.0	0.1	3.7	11.9	26.8	76.5	100.0	992.7	997.5	1002.6
25/08/2020	4.0	9.1	14.8	0.0	0.0	3.4	12.6	34.0	72.8	100.0	1002.5	1004.7	1007.3
26/08/2020	5.4	10.7	17.2	0.0	0.0	2.9	13.1	31.4	71.5	100.0	1004.7	1006.6	1009.0
27/08/2020	6.2	12.6	20.4	0.0	0.2	2.9	15.3	15.9	54.9	99.3	998.6	1002.5	1005.4
28/08/2020	9.3	13.3	18.1	0.0	0.2	4.5	15.2	22.2	48.9	100.0	997.5	1002.8	1007.5
29/08/2020	7.6	13.5	20.5	0.0	0.1	3.2	10.7	24.6	92.8	100.0	1005.2	1007.1	1009.4
30/08/2020	9.0	16.8	23.8	0.0	0.6	5.6	16.6	27.5	61.5	100.0	996.9	1001.1	1006.0
31/08/2020	11.3	15.9	22.8	0.0	0.2	4.7	26.4	19.1	56.6	75.8	994.3	997.5	1002.5
Monthly	3.9	12.2	23.8	52.2	0.0	4.5	50.4	15.9	84.6	100.0	971.5	994.0	1009.4





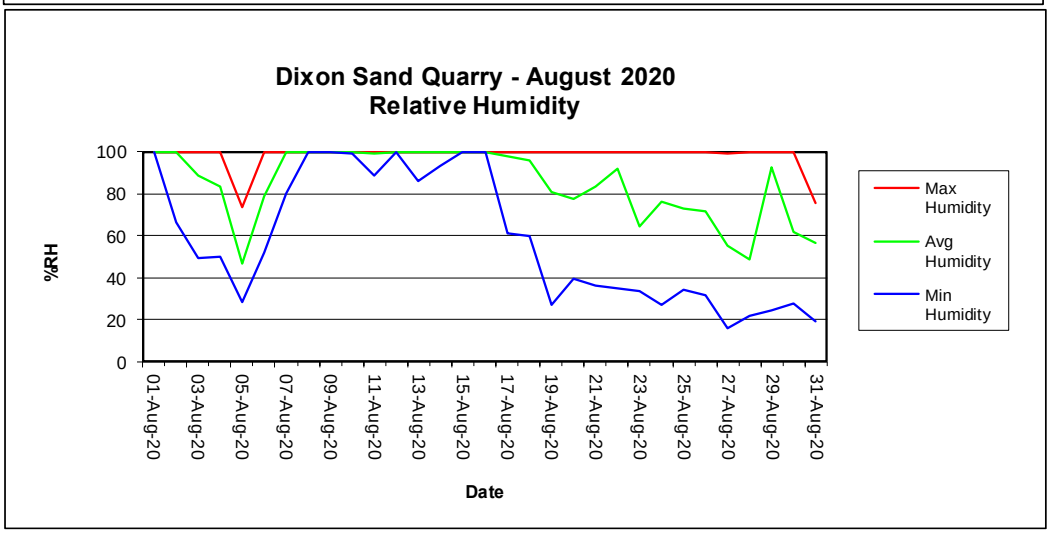


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

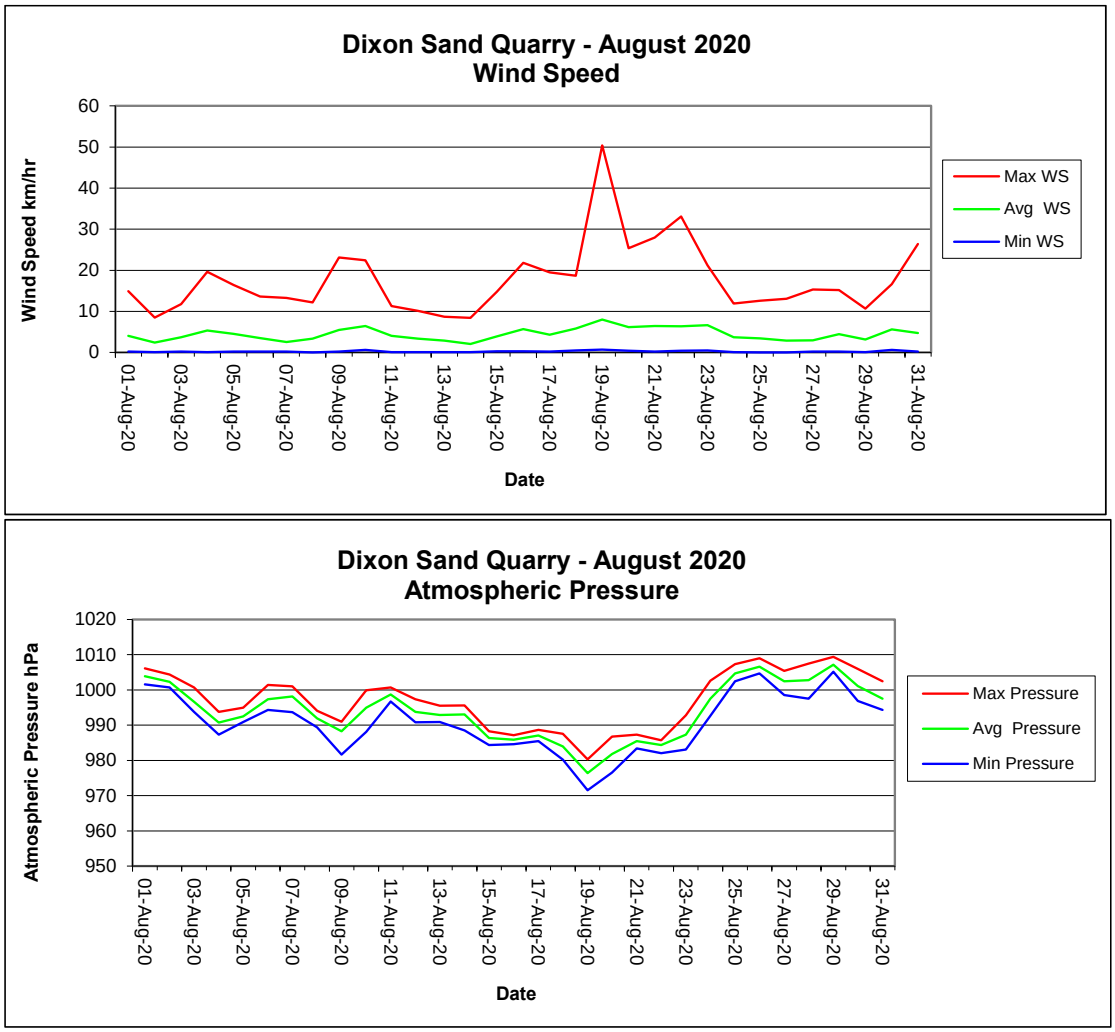
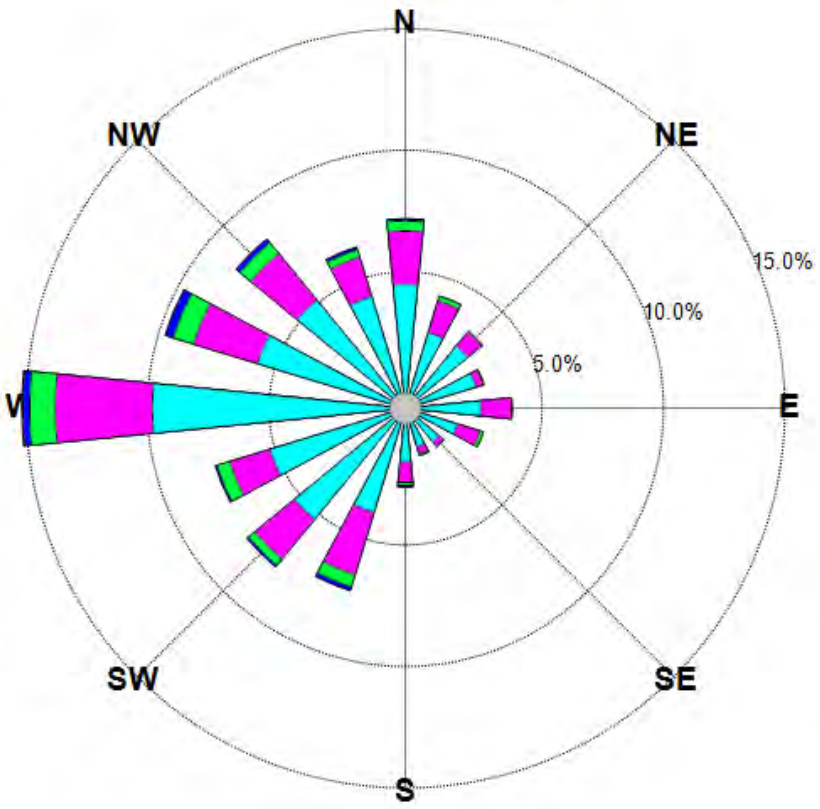


Figure 3: *Wind Speed and Atmospheric Pressure Charts*

Dixon Sand Quarry - Windrose

AUGUST 2020



Calms %: 8.3
Average Windspeed (km/h): 4.4
Maximum Windspeed (km/h): 50.4
Prevailing Wind Direction: 270

WIND SPEED (km/h)

- > 35 (0.0%)
- 25 - 35 (0.1%)
- 15 - 25 (1.4%)
- 10 - 15 (5.3%)
- 5 - 10 (25.7%)
- 1 - 5 (59.3%)

Appendix 1

Calibration Documents (when required)

CARBON BASED ENVIRONMENTAL

Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB

teledata

TEOM Client/Site: Dixon Sands / TEOM 1 **Date:** 31.8.20.

1. TEOM Data Screen **SERIAL No:** 25570 **Firmware:** N/A

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	4 ✓ OL	Green - Normal	✓	
Date/time	TEOM: 31.8.20 11:37 Actual: 31-8-20 11:40	Current Date/time correct within 5 minutes	✓	
PM-10 24hr av	18.9	Positive values	✓	
Filter loading PM10	63	<80 %	✓	
Frequency PM-10	252.9731	200-300 Hz	✓	
Noise PM-10	0.043	<0.100ug	✓	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

Comments:

2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	N/A	<0.50 atm	–	–
Warnings	NIL	No Warnings	✓	
If any warnings list:				

Comments:

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DAVIES **Signed**

3. Instrument Conditions Ambient Conditions and Temperatures

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	20.6	-10 to 50 C	✓	
Ambient Dew Point	6.2	-10 to 50 C	✓	
Ambient Pressure	0.996	0.9-1.1 atm	✓	
Ambient Relative Humidity	38.3	10-100 %RH	✓	
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

4. Instrument Conditions – Flows

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.68	12.95 – 14.39 lpm	✓	
Total Flow rate	16.68	15.67 – 17.67 lpm	✓	

Comments:

Results: (Tick box)

☑ **There were NO equipment faults found. No action required – (file report)**

☐ **There were faults found (Fails) – Were these fixed on site: YES/NO (circle)**
Any Fails that cannot be repaired on site must be reported to CBased:
Office: 65713334 or email cbased@bigpond.com
Date faults notified to CBased: _____

Comments/Action Required:

Calibration/Maintenance

1. 1405A: Were Filters replaced YES/NO
2. PM10 Inlet head cleaned YES/NO
3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10					

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable) Pass/Fail – if Fail – install new filter and redo stability test.

4. Instrument clock verified (Refer Section 1) YES/NO.
If Time changed – clock reset OK YES/NO or NA (not changed)
Comments:

5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary. YES/NO.
Comments if changed:

6. TEOM Cleaned and Air Conditioner checked YES/NO. Air Conditioner settings or operational status: OK

Tetracal Flow/Temp/Pressure Calibrator Serial No: 1009 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

Quarterly or Six Monthly Calibration

1. Flow Verification – Conducted YES/NO

PM10 Flow verified Flow l/min 2.95 Error % 1.7 (allowed error <6%) PASS/FAIL
Final 3.00 ✓

Bypass Flow verified Flow l/min 13.98 Error % 1.4 (allowed error <6%) PASS/FAIL
If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:** Final 13.65 ✓

2. Leak Check – Conducted YES/NO

PM10 actual 0.05 < Limit 0.15

Bypass actual 0.21 < Limit 0.60

Leak check PASS/FAIL – If fail then find leak and retest.
Comments:
OK

Annual Calibration/Maintenance

1. Temperature and Pressure Calibration – Conducted YES/NO
Reference Temperature: _____C TEOM Temperature_____C
if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: _____atm TEOM Pressure_____atm
if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO

Note: Tetracal measures Atmospheric Pressure in mm Hg or mb or hPa
For mb or hPa divide tetracal result by 1013.25 to change units to atm.
For mmHg divide tetracal result by 760 to change units to atm.

2. Flow Calibration – Conducted YES/NO
PM10
Set point 2.4 Actual:_____
Set point 3.6 Actual:_____
Set point 3.0 Actual:_____ After calibration Final:_____l/min

NA

BYPASS
Set point 10.9 Actual:_____
Set point 16.4 Actual:_____
Set point 13.67 Actual:_____ After calibration Final:_____l/min

3. Mass calibration (K0) Verification – Conducted YES/NO
Actual measured KO = _____ TEOM stated K0_____ Error %:_____
Allowed Error +/- 2.5%. PASS/FAIL
If Error +/- 2.5% repeat. If confirmed consult manufacturer.
Second Error % =_____ PASS/FAIL. Comments:
If second test fails consult manufacturer.

4. Annual Noise check - Conducted YES/NO
Zero filter applied to TEOM and TEOM operated for at least 12 hours:
Start date/time: _____Finish date/time:_____
Standard deviation of all recorded data (min 30 min averages) = _____ug/m^3
Noise was less than $5ug/m^3$ YES/NO

5. Maintenance
Air Inlet system cleaned YES/NO
Pump Reconditioned YES/NO
Check Waterproofing YES/NO
Comments:

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

September 2020
Amendment 1

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for September 2020 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from the 1st July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for September 2020.

Approximately 100% of TEOM data was recovered for September 2020.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

A quarterly calibration was undertaken in August 2020 and the next calibration (annual) is scheduled for November 2020. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for September 2020 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/09/2020	15.8	10.8	39.5	27.0
2/09/2020	17.0	10.9	42.5	27.2
3/09/2020	28.3	11.1	70.8	27.9
4/09/2020	22.8	11.3	57.0	28.3
5/09/2020	12.2	11.3	30.5	28.3
6/09/2020	17.9	11.4	44.8	28.6
7/09/2020	18.1	11.5	45.3	28.8
8/09/2020	15.6	11.6	39.0	29.0
9/09/2020	13.4	11.6	33.5	29.0
10/09/2020	9.7	11.6	24.3	29.0
11/09/2020	12.2	11.6	30.5	29.0
12/09/2020	7.2	11.5	18.0	28.8
13/09/2020	9.4	11.5	23.5	28.8
14/09/2020	13.2	11.5	33.0	28.8
15/09/2020	17.8	11.6	44.5	29.0
16/09/2020	23.3	11.8	58.3	29.4
17/09/2020	30.6	12.0	76.5	30.0
18/09/2020	15.9	12.1	39.8	30.1
19/09/2020	12.7	12.1	31.8	30.1
20/09/2020	6.8	12.0	17.0	30.0
21/09/2020	9.4	12.0	23.5	29.9
22/09/2020	22.4	12.1	56.0	30.2
23/09/2020	23.9	12.2	59.8	30.6
24/09/2020	15.9	12.3	39.8	30.7
25/09/2020	14.0	12.3	35.0	30.7
26/09/2020	8.3	12.2	20.8	30.6
27/09/2020	9.7	12.2	24.3	30.5
28/09/2020	17.7	12.3	44.3	30.7
29/09/2020	16.1	12.3	40.3	30.8
30/09/2020	18.5	12.4	46.3	31.0

*Calculated from PM10

**Calculated from PM10 Annual Average

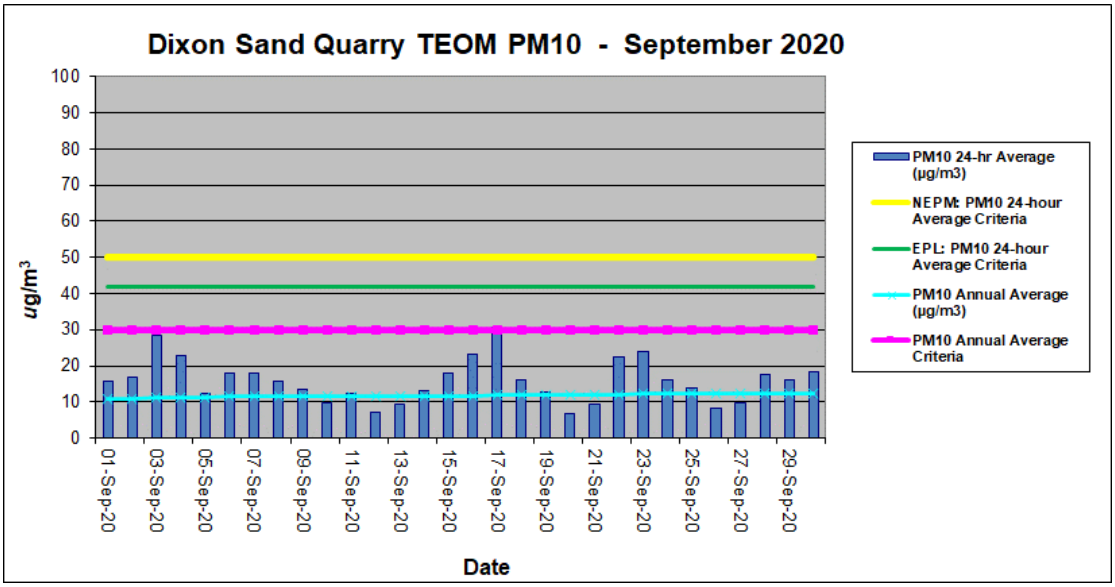


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

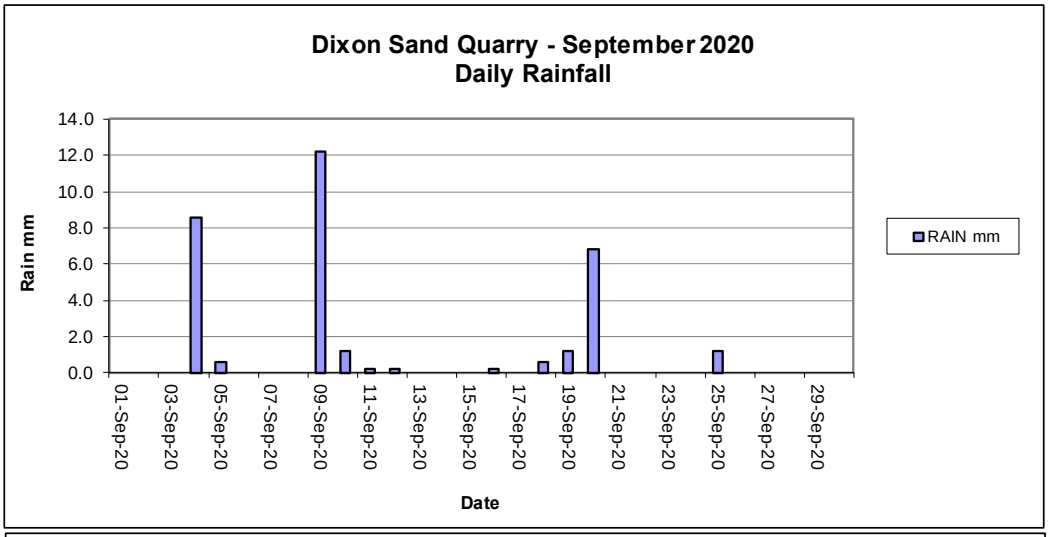
The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

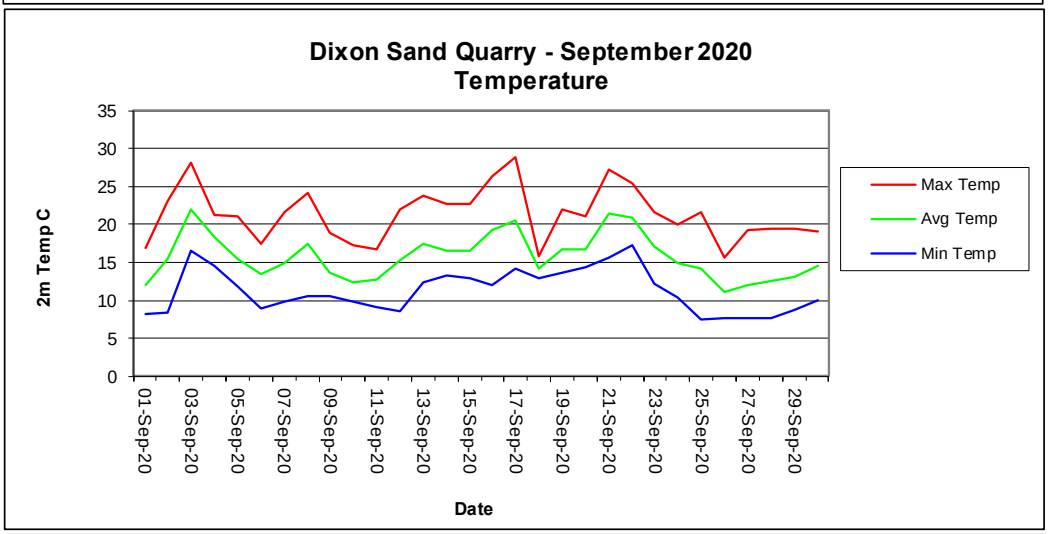
A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for September 2020

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/09/2020	8.2	12.1	16.9	0.0	0.0	3.5	16.9	48.2	81.8	99.7	999.7	1001.6	1003.9
2/09/2020	8.4	15.5	23.1	0.0	0.2	4.7	17.9	47.7	96.0	100.0	995.7	998.3	1000.4
3/09/2020	16.6	21.9	28.1	0.0	0.8	7.2	21.7	26.2	98.5	100.0	993.3	995.3	997.4
4/09/2020	14.5	18.4	21.3	8.6	0.2	4.5	16.7	85.1	99.9	100.0	992.9	994.7	997.5
5/09/2020	11.9	15.5	21.0	0.6	0.0	3.3	12.5	49.9	87.4	100.0	993.0	996.7	1002.8
6/09/2020	8.9	13.4	17.4	0.0	0.0	4.0	24.2	65.6	92.6	100.0	1002.8	1006.0	1008.8
7/09/2020	9.9	15.0	21.7	0.0	0.1	3.5	14.7	77.6	97.6	100.0	1007.3	1009.0	1010.7
8/09/2020	10.6	17.4	24.1	0.0	0.1	4.3	14.4	57.1	90.5	99.5	1003.5	1006.1	1009.2
9/09/2020	10.5	13.7	18.9	12.2	0.1	3.9	11.2	83.9	98.1	100.0	1002.2	1005.4	1007.2
10/09/2020	9.8	12.5	17.2	1.2	0.3	4.2	13.1	72.9	98.2	100.0	1004.9	1006.9	1008.9
11/09/2020	9.1	12.7	16.7	0.2	0.0	3.8	15.9	64.5	96.5	100.0	1007.1	1008.6	1010.8
12/09/2020	8.5	15.4	21.9	0.2	0.4	4.2	16.6	47.0	98.3	100.0	1002.0	1004.9	1008.2
13/09/2020	12.3	17.4	23.8	0.0	0.4	4.7	15.0	99.3	99.5	99.8	999.9	1001.6	1003.3
14/09/2020	13.2	16.6	22.7	0.0	0.2	4.6	18.6	69.9	99.2	100.0	1000.8	1003.0	1006.3
15/09/2020	13.0	16.5	22.7	0.0	0.1	3.3	13.0	52.9	94.3	100.0	1003.5	1005.6	1008.0
16/09/2020	12.0	19.3	26.4	0.2	0.2	4.9	20.3	32.1	99.3	100.0	997.6	1001.1	1005.0
17/09/2020	14.2	20.5	28.8	0.0	0.1	5.6	29.2	48.3	96.4	100.0	998.7	1001.9	1009.0
18/09/2020	12.9	14.3	15.9	0.6	0.1	3.4	14.3	84.2	99.8	100.0	1007.5	1008.9	1010.8
19/09/2020	13.7	16.8	22.0	1.2	0.2	4.3	17.8	100.0	100.0	100.0	997.6	1002.8	1007.7
20/09/2020	14.4	16.8	21.1	6.8	0.1	4.8	22.7	99.6	100.0	100.0	990.4	993.6	997.6
21/09/2020	15.7	21.4	27.2	0.0	0.2	6.9	20.2	90.6	100.0	100.0	985.4	989.2	992.4
22/09/2020	17.3	20.9	25.5	0.0	0.1	5.4	19.7	16.6	72.9	100.0	985.7	989.1	991.9
23/09/2020	12.2	17.0	21.7	0.0	0.2	4.8	21.4	24.9	41.8	80.6	989.3	991.5	993.8
24/09/2020	10.3	14.9	20.0	0.0	0.0	4.5	21.1	23.5	50.2	92.0	990.2	992.1	993.4
25/09/2020	7.4	14.2	21.6	1.2	0.2	7.4	30.3	30.1	69.1	100.0	977.6	985.3	991.6
26/09/2020	7.6	11.1	15.6	0.0	0.7	5.9	30.2	28.9	58.3	100.0	985.4	990.2	996.3
27/09/2020	7.6	11.9	19.3	0.0	0.1	4.0	19.3	31.9	69.3	100.0	996.0	1000.4	1005.3
28/09/2020	7.6	12.6	19.4	0.0	0.0	3.1	17.4	34.6	95.1	100.0	1002.1	1004.5	1006.7
29/09/2020	8.7	13.1	19.5	0.0	0.0	3.4	17.4	36.0	83.3	100.0	1000.8	1003.5	1006.5
30/09/2020	10.1	14.5	19.0	0.0	0.1	4.7	20.6	52.0	86.3	100.0	991.8	996.0	1000.7
Monthly	7.4	15.8	28.8	33.0	0.0	4.6	30.3	16.6	88.3	100.0	977.6	999.8	1010.8





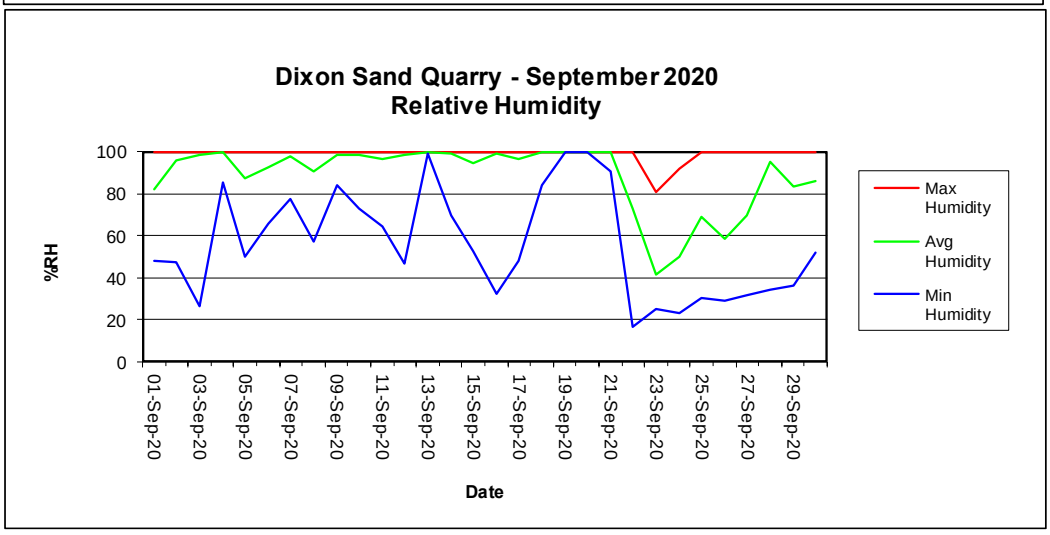


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

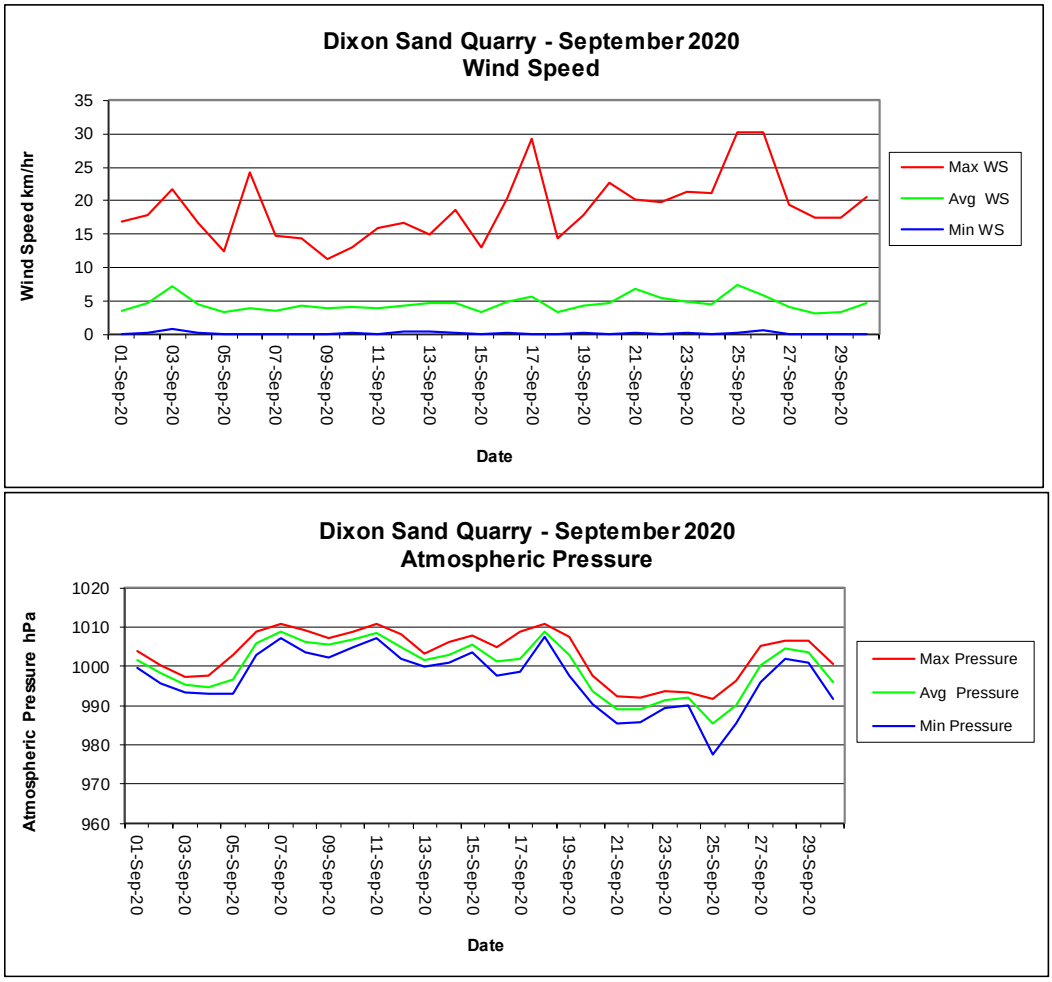
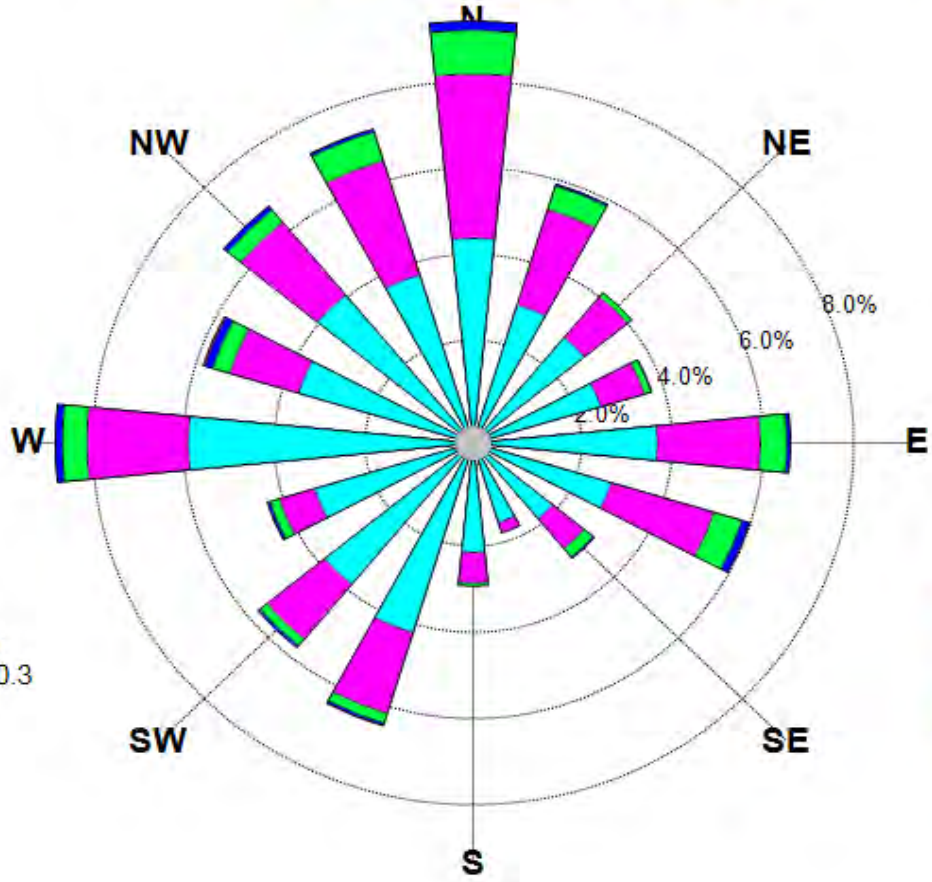


Figure 3: *Wind Speed and Atmospheric Pressure Charts*

Dixon Sand Quarry - Windrose

SEPTEMBER 2020



Calms %: 11.4
Average Windspeed (km/h): 4.5
Maximum Windspeed (km/h): 30.3
Prevailing Wind Direction: 360

WIND SPEED (km/h)

- > 35 (0.0%)
- 25 - 35 (0.0%)
- 15 - 25 (1.3%)
- 10 - 15 (6.1%)
- 5 - 10 (28.0%)
- 1 - 5 (53.2%)

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

October 2020
Amendment 1



Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for October 2020 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
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- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

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Approximately 100% of TEOM data was recovered for October 2020.

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- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

A quarterly calibration was undertaken in August 2020 and the next calibration (annual) is scheduled for November 2020. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for October 2020 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/10/2020	12.2	12.4	30.5	31.0
2/10/2020	16.6	12.4	41.5	31.1
3/10/2020	27.4	12.6	68.5	31.5
4/10/2020	16.8	12.6	42.0	31.6
5/10/2020	16.4	12.7	41.0	31.7
6/10/2020	14.2	12.7	35.5	31.7
7/10/2020	15.5	12.7	38.8	31.8
8/10/2020	15.5	12.7	38.8	31.9
9/10/2020	13.1	12.7	32.8	31.9
10/10/2020	9.0	12.7	22.5	31.8
11/10/2020	10.7	12.7	26.8	31.7
12/10/2020	18.7	12.7	46.8	31.9
13/10/2020	18.2	12.8	45.5	32.0
14/10/2020	22.3	12.9	55.8	32.2
15/10/2020	17.3	12.9	43.3	32.3
16/10/2020	17.3	13.0	43.3	32.4
17/10/2020	19.4	13.0	48.5	32.6
18/10/2020	8.8	13.0	22.0	32.5
19/10/2020	12.8	13.0	32.0	32.5
20/10/2020	10.2	13.0	25.5	32.4
21/10/2020	12.3	13.0	30.8	32.4
22/10/2020	16.0	13.0	40.0	32.5
23/10/2020	12.8	13.0	31.9	32.5
24/10/2020	8.4	12.9	21.0	32.4
25/10/2020	4.5	12.9	11.3	32.2
26/10/2020	6.1	12.8	15.3	32.0
27/10/2020	7.2	12.8	18.0	31.9
28/10/2020	8.9	12.7	22.3	31.8
29/10/2020	6.8	12.7	17.0	31.7
30/10/2020	8.5	12.6	21.3	31.6
31/10/2020	11.1	12.6	27.8	31.6

*Calculated from PM10

**Calculated from PM10 Annual Average

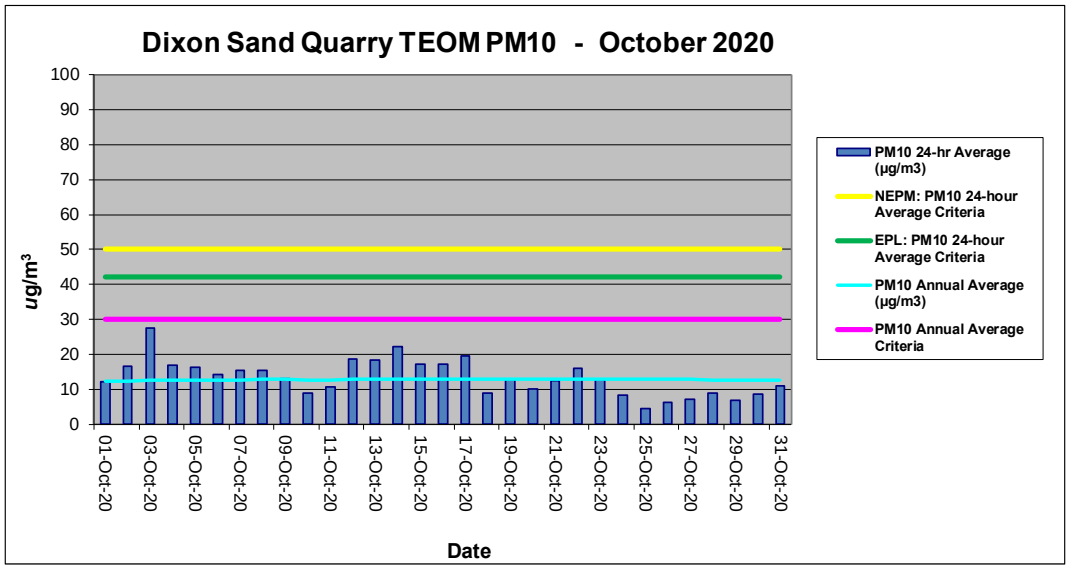


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

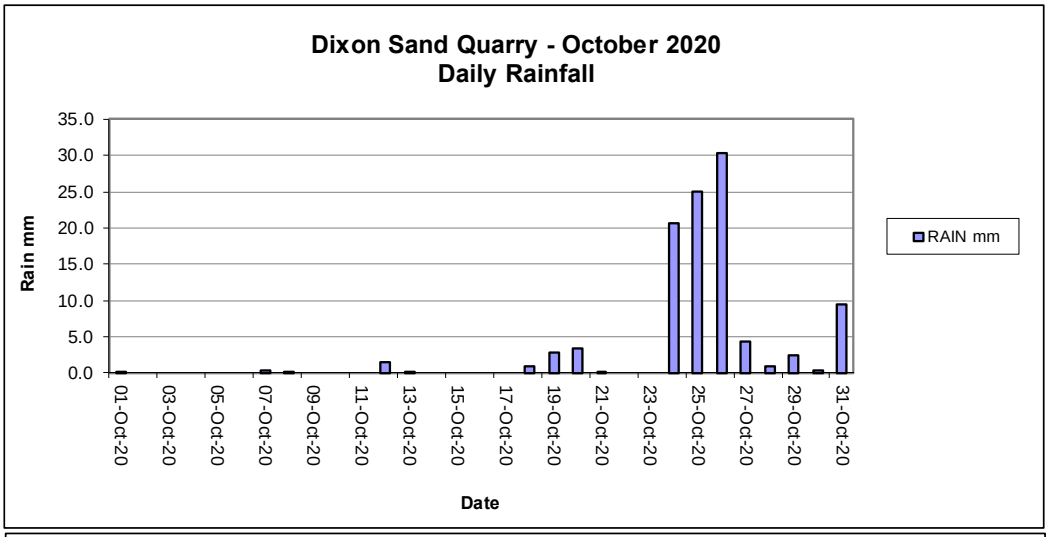
The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

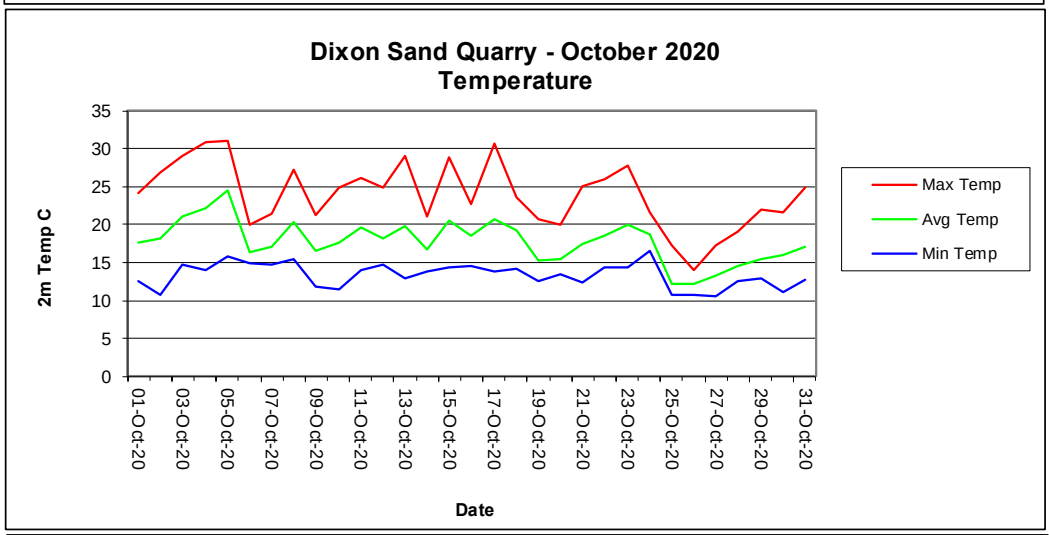
A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for October 2020

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/10/2020	12.6	17.6	24.1	0.2	0.1	5.5	37.4	17.7	69.4	100.0	990.8	994.9	1001.3
2/10/2020	10.7	18.1	26.9	0.0	0.0	3.7	10.4	19.8	61.3	100.0	1000.4	1002.3	1003.8
3/10/2020	14.8	21.1	29.0	0.0	0.0	5.0	17.0	14.9	47.1	100.0	999.6	1002.5	1006.0
4/10/2020	14.0	22.2	30.8	0.0	0.4	4.8	14.4	19.2	57.9	100.0	995.0	998.2	1000.9
5/10/2020	15.8	24.5	31.1	0.0	0.4	6.6	27.8	22.6	40.4	97.6	993.9	996.1	998.9
6/10/2020	14.9	16.4	20.0	0.0	0.4	4.2	14.2	65.6	89.0	99.3	998.5	1000.0	1001.7
7/10/2020	14.7	17.1	21.4	0.4	0.2	3.2	24.8	69.3	93.1	100.0	995.4	998.4	1001.2
8/10/2020	15.4	20.4	27.3	0.2	0.3	5.7	29.9	38.7	79.4	100.0	987.8	990.9	996.6
9/10/2020	11.8	16.6	21.2	0.0	0.2	4.5	17.7	29.9	51.2	72.2	991.1	993.5	996.5
10/10/2020	11.5	17.7	24.8	0.0	0.2	3.2	13.5	18.0	39.5	61.7	995.2	997.3	999.4
11/10/2020	14.1	19.6	26.1	0.0	0.2	3.7	10.6	27.8	43.7	99.6	997.1	999.3	1001.6
12/10/2020	14.7	18.1	24.9	1.6	0.1	4.7	19.8	46.7	82.5	99.9	998.4	1001.2	1003.4
13/10/2020	12.9	19.9	29.1	0.2	0.0	4.1	21.4	17.3	64.8	100.0	998.7	1001.1	1005.6
14/10/2020	13.8	16.8	21.0	0.0	0.2	5.1	14.4	54.7	83.7	100.0	1002.2	1004.3	1006.6
15/10/2020	14.3	20.5	28.8	0.0	0.0	4.6	16.8	30.7	66.4	100.0	992.7	997.5	1003.4
16/10/2020	14.6	18.5	22.7	0.0	0.2	4.1	15.4	40.3	67.9	94.4	991.9	996.6	999.5
17/10/2020	13.9	20.7	30.6	0.0	0.3	4.1	16.1	34.4	69.1	99.2	986.4	991.8	998.6
18/10/2020	14.2	19.3	23.6	1.0	0.2	4.2	19.3	49.5	71.8	99.4	987.7	990.1	994.5
19/10/2020	12.6	15.4	20.7	2.8	0.3	4.9	21.1	56.0	94.9	100.0	993.6	995.6	998.1
20/10/2020	13.4	15.5	19.9	3.4	0.2	3.8	21.4	67.1	94.7	100.0	995.3	997.2	998.9
21/10/2020	12.4	17.5	25.0	0.2	0.2	4.1	16.2	44.4	79.7	99.7	991.8	994.6	997.0
22/10/2020	14.3	18.5	25.9	0.0	0.1	4.1	24.1	44.1	86.2	100.0	991.3	993.4	995.1
23/10/2020	14.4	19.9	27.8	0.0	0.4	4.8	18.5	36.9	82.9	100.0	987.2	990.9	994.2
24/10/2020	16.6	18.7	21.6	20.6	0.2	5.7	18.8	85.4	98.4	100.0	982.7	984.9	987.3
25/10/2020	10.8	12.2	17.2	25.0	0.3	5.9	19.2	99.3	99.9	100.0	984.7	991.8	995.6
26/10/2020	10.7	12.1	14.0	30.4	0.9	7.5	26.7	99.3	100.0	100.0	993.3	996.3	999.5
27/10/2020	10.6	13.2	17.3	4.4	0.0	4.9	14.9	99.3	99.9	100.0	996.5	998.4	1000.2
28/10/2020	12.5	14.5	19.1	1.0	0.3	3.1	12.7	99.6	100.0	100.0	993.6	996.9	999.3
29/10/2020	13.0	15.6	22.0	2.4	0.1	4.2	16.8	100.0	100.0	100.0	988.6	991.3	994.8
30/10/2020	11.1	15.9	21.6	0.4	0.1	4.1	18.7	99.4	100.0	100.0	987.4	989.4	991.5
31/10/2020	12.7	17.1	24.9	9.4	0.1	4.7	31.0	61.8	99.4	100.0	985.6	987.9	991.6
Monthly	10.6	17.8	31.1	103.6	0.0	4.6	37.4	14.9	77.9	100.0	982.7	995.6	1006.6





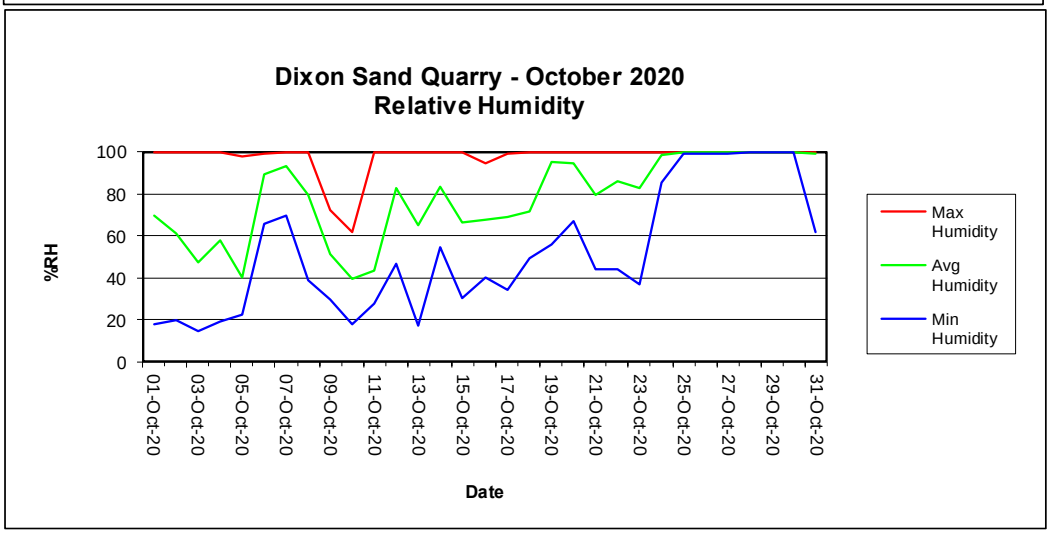


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

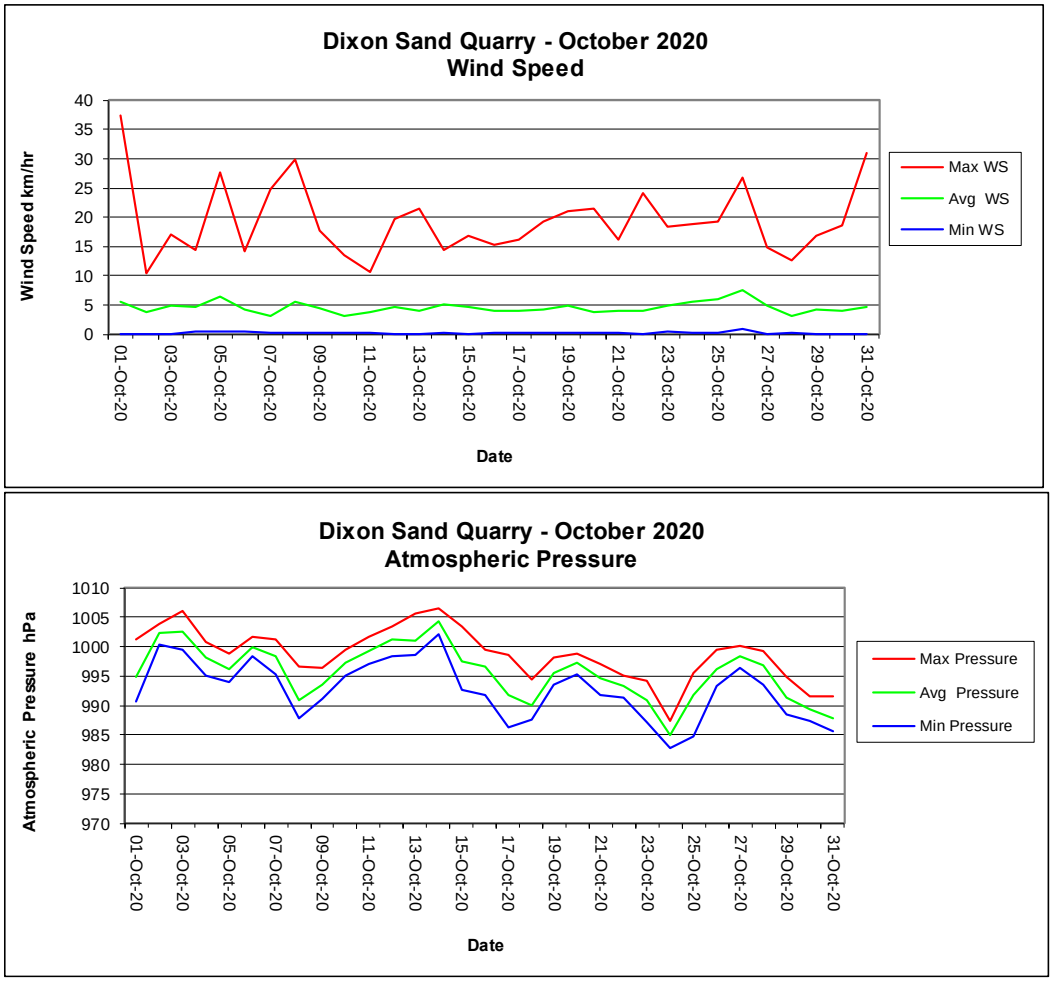
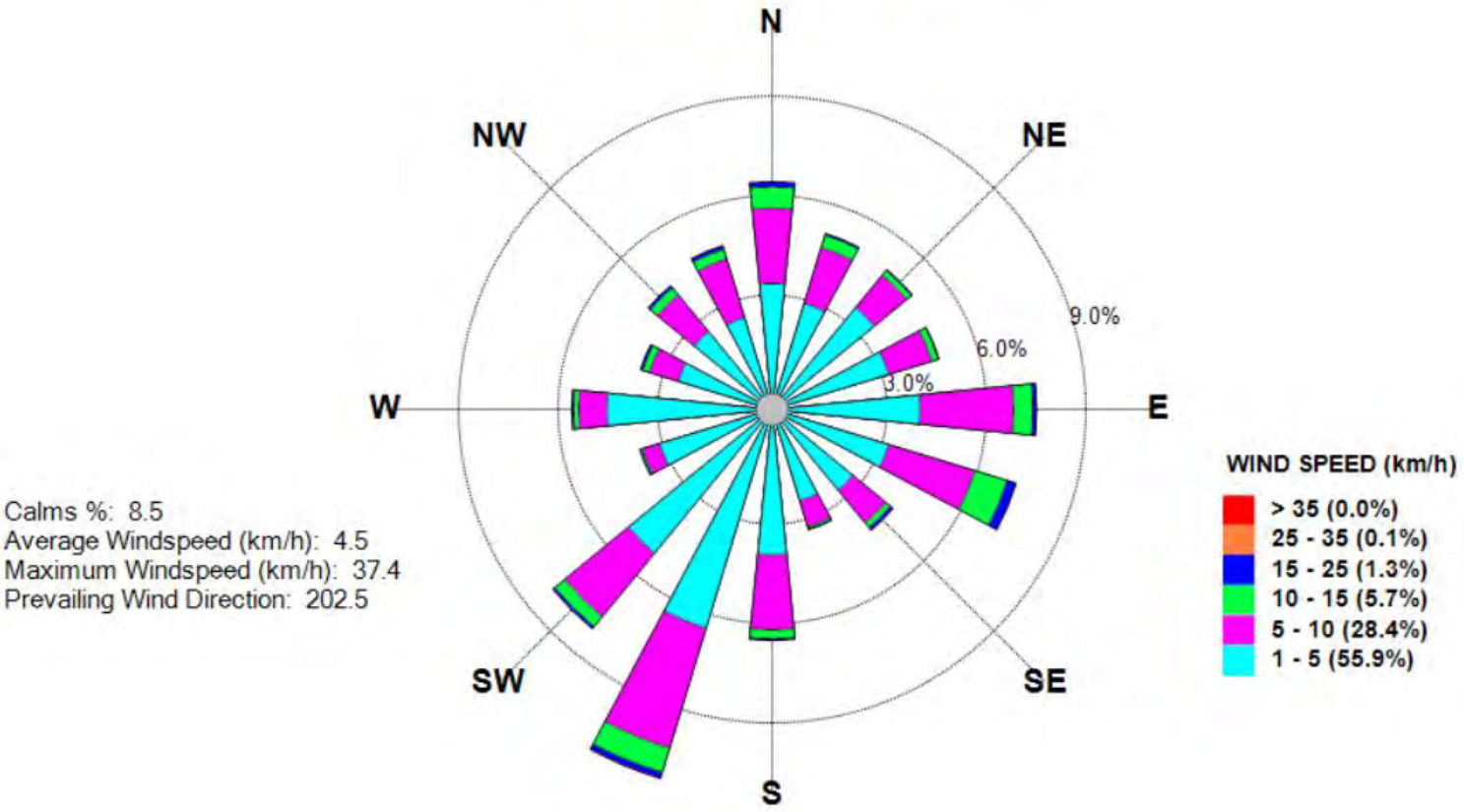


Figure 3: *Wind Speed and Atmospheric Pressure Charts*

Dixon Sand Quarry - Windrose

OCTOBER 2020



Calms %: 8.5
Average Windspeed (km/h): 4.5
Maximum Windspeed (km/h): 37.4
Prevailing Wind Direction: 202.5

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

November 2020

Amendment 1



Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for November 2020 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from 1 July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for November 2020.

Approximately 100% of TEOM data was recovered for November 2020.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration, originally scheduled for November, was conducted on 10-11 December 2020 and the next calibration (annual) is scheduled for February 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for November 2020 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/11/2020	7.4	12.6	18.5	31.5
2/11/2020	12.8	12.6	32.0	31.5
3/11/2020	10.8	12.6	27.0	31.5
4/11/2020	11.3	12.6	28.3	31.4
5/11/2020	10.7	12.6	26.8	31.4
6/11/2020	10.3	12.5	25.8	31.4
7/11/2020	15.4	12.6	38.5	31.4
8/11/2020	12.6	12.6	31.5	31.4
9/11/2020	9.1	12.5	22.8	31.3
10/11/2020	11.5	12.5	28.8	31.3
11/11/2020	14.0	12.5	35.0	31.3
12/11/2020	18.2	12.6	45.5	31.5
13/11/2020	12.8	12.6	32.0	31.5
14/11/2020	10.7	12.6	26.8	31.4
15/11/2020	14.1	12.6	35.3	31.5
16/11/2020	22.8	12.7	57.0	31.6
17/11/2020	36.0	12.8	90.0	32.1
18/11/2020	19.2	12.9	48.0	32.2
19/11/2020	17.9	12.9	44.8	32.3
20/11/2020	25.1	13.0	62.7	32.5
21/11/2020	26.4	13.1	66.0	32.7
22/11/2020	15.1	13.1	37.8	32.7
23/11/2020	13.5	13.1	33.7	32.7
24/11/2020	11.9	13.1	29.8	32.7
25/11/2020	13.0	13.1	32.5	32.7
26/11/2020	23.8	13.2	59.5	32.9
27/11/2020	31.0	13.3	77.5	33.2
28/11/2020	26.1	13.4	65.3	33.4
29/11/2020	41.2	13.5	103.0	33.9
30/11/2020	26.3	13.6	65.8	34.1

*Calculated from PM10

**Calculated from PM10 Annual Average

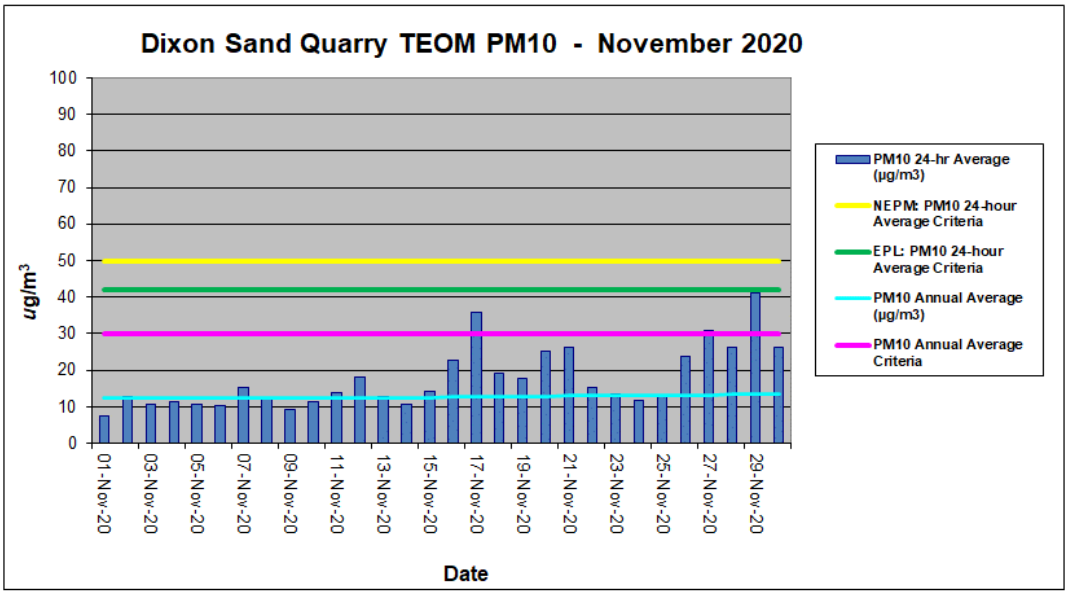


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for November 2020

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/11/2020	11.8	14.5	17.7	6.6	0.0	5.2	20.4	82.8	97.9	100.0	990.6	996.2	1003.8
2/11/2020	12.3	15.8	21.2	0.0	0.2	4.6	11.6	55.5	89.9	100.0	1002.9	1005.1	1006.8
3/11/2020	11.1	16.1	23.1	0.0	0.0	4.0	15.3	46.4	79.5	100.0	1000.6	1003.3	1006.4
4/11/2020	12.5	20.4	28.9	0.0	0.0	4.8	20.1	22.0	60.3	99.3	988.5	994.0	1001.0
5/11/2020	10.8	15.1	23.8	22.2	0.3	4.6	19.5	35.7	85.6	100.0	986.4	990.0	995.7
6/11/2020	11.4	14.9	21.6	0.0	0.1	6.2	22.0	37.5	73.7	100.0	994.5	996.3	997.9
7/11/2020	10.5	14.9	20.6	0.0	0.1	3.2	26.0	46.0	81.4	100.0	996.4	1000.5	1006.3
8/11/2020	11.8	15.0	20.0	0.2	0.1	4.6	22.2	44.9	74.2	99.2	1005.3	1006.6	1007.9
9/11/2020	12.5	15.6	21.1	0.0	0.0	3.7	18.7	47.5	73.5	99.3	1002.3	1005.0	1007.3
10/11/2020	11.4	16.5	23.3	0.0	0.2	3.9	24.3	37.8	70.2	99.2	997.6	1001.2	1004.1
11/11/2020	13.2	19.9	28.2	0.0	0.1	4.7	20.2	30.6	71.8	99.4	991.8	995.8	1000.0
12/11/2020	16.4	22.8	28.8	0.0	0.5	5.4	19.8	32.7	61.8	99.2	985.3	988.6	993.1
13/11/2020	15.8	19.5	26.8	8.8	0.4	5.2	19.8	45.1	82.6	99.3	980.8	984.6	987.5
14/11/2020	15.6	19.8	27.5	0.0	0.0	4.0	19.4	31.6	66.4	94.0	984.9	988.5	993.8
15/11/2020	13.9	22.4	32.6	0.0	0.1	4.4	21.1	20.5	61.3	99.3	992.6	994.1	995.7
16/11/2020	19.0	27.8	36.9	0.0	0.2	4.9	18.5	16.0	40.9	72.0	987.5	990.8	994.5
17/11/2020	15.8	19.2	23.0	0.0	0.2	6.4	25.5	54.4	74.1	99.2	992.9	998.0	1003.1
18/11/2020	15.1	17.9	22.6	0.8	0.3	4.9	19.3	53.8	80.1	99.9	1000.3	1002.3	1004.1
19/11/2020	14.5	19.9	27.1	0.0	0.2	4.0	19.7	44.1	75.7	99.2	996.3	999.9	1002.8
20/11/2020	16.5	24.2	32.8	5.2	0.2	5.2	24.9	26.9	66.4	99.3	992.8	996.0	1000.0
21/11/2020	16.1	19.4	24.9	0.6	0.1	4.5	20.4	57.0	77.6	99.5	997.4	999.9	1002.1
22/11/2020	15.8	21.6	28.6	0.6	0.1	3.6	12.0	53.7	81.6	100.0	990.7	995.0	999.9
23/11/2020	17.6	21.7	23.6	1.8	0.1	4.2	19.5	57.6	77.3	99.2	984.7	987.6	990.7
24/11/2020	15.3	18.4	22.9	0.0	0.2	4.3	22.5	50.8	78.3	99.3	988.0	990.6	994.0
25/11/2020	15.5	18.9	23.9	0.0	0.1	2.9	11.6	52.4	77.7	99.4	990.3	992.7	994.8
26/11/2020	16.1	23.6	34.0	0.0	0.0	4.6	17.6	27.3	59.8	87.9	989.1	991.3	997.2
27/11/2020	17.2	22.0	29.8	0.0	0.2	5.6	22.0	44.0	69.1	87.8	991.3	995.3	998.7
28/11/2020	23.0	31.3	38.4	0.0	0.4	6.7	20.5	15.4	40.7	79.2	984.6	988.0	992.1
29/11/2020	18.5	30.0	38.8	0.0	0.3	8.5	58.2	17.1	36.0	69.7	978.9	983.9	994.4
30/11/2020	17.0	19.0	21.9	0.0	0.3	4.9	23.2	45.8	65.6	75.0	994.1	995.4	997.2
Monthly	10.5	19.9	38.8	46.8	0.0	4.8	58.2	15.4	71.0	100.0	978.9	995.2	1007.9

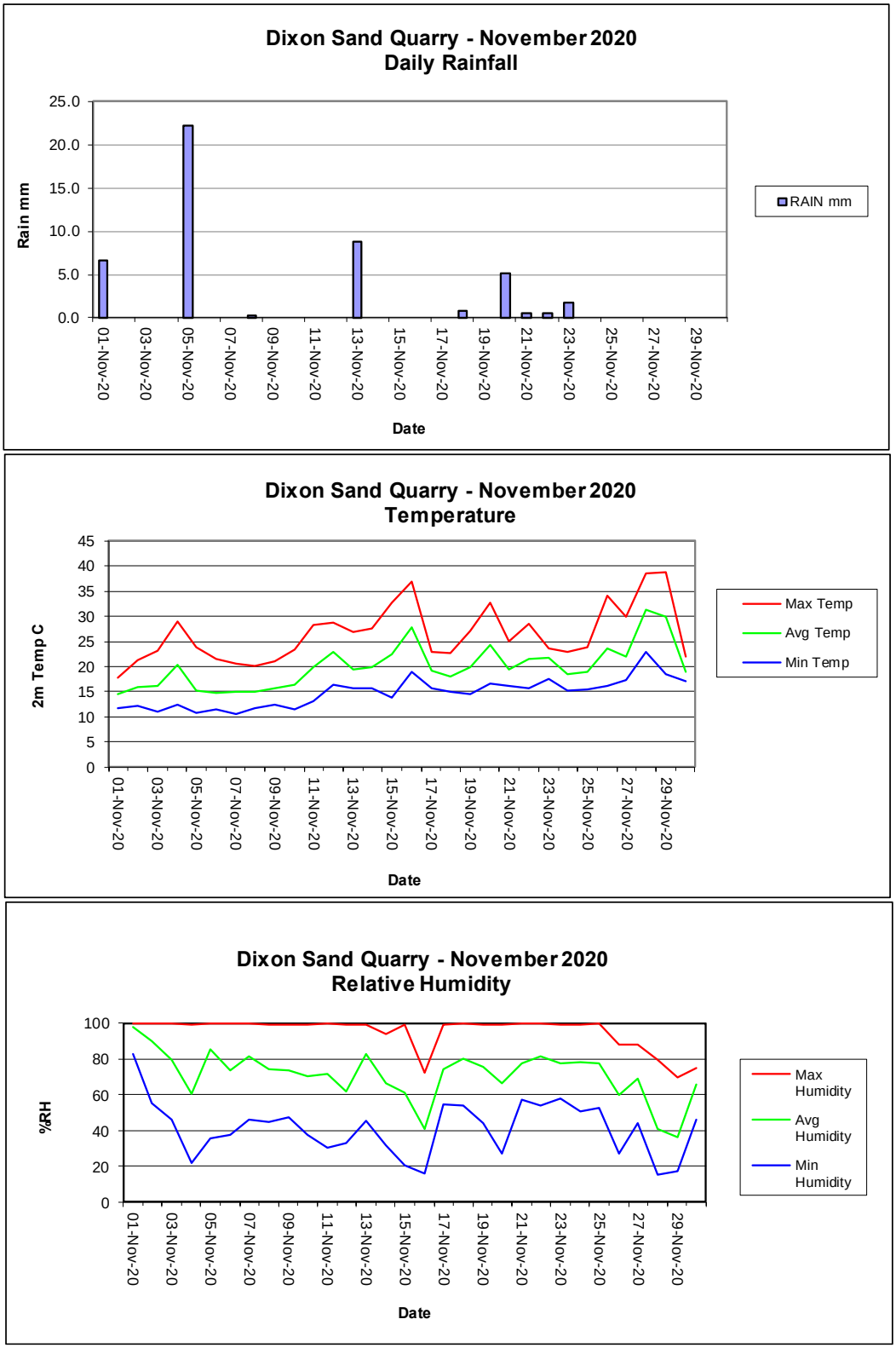


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

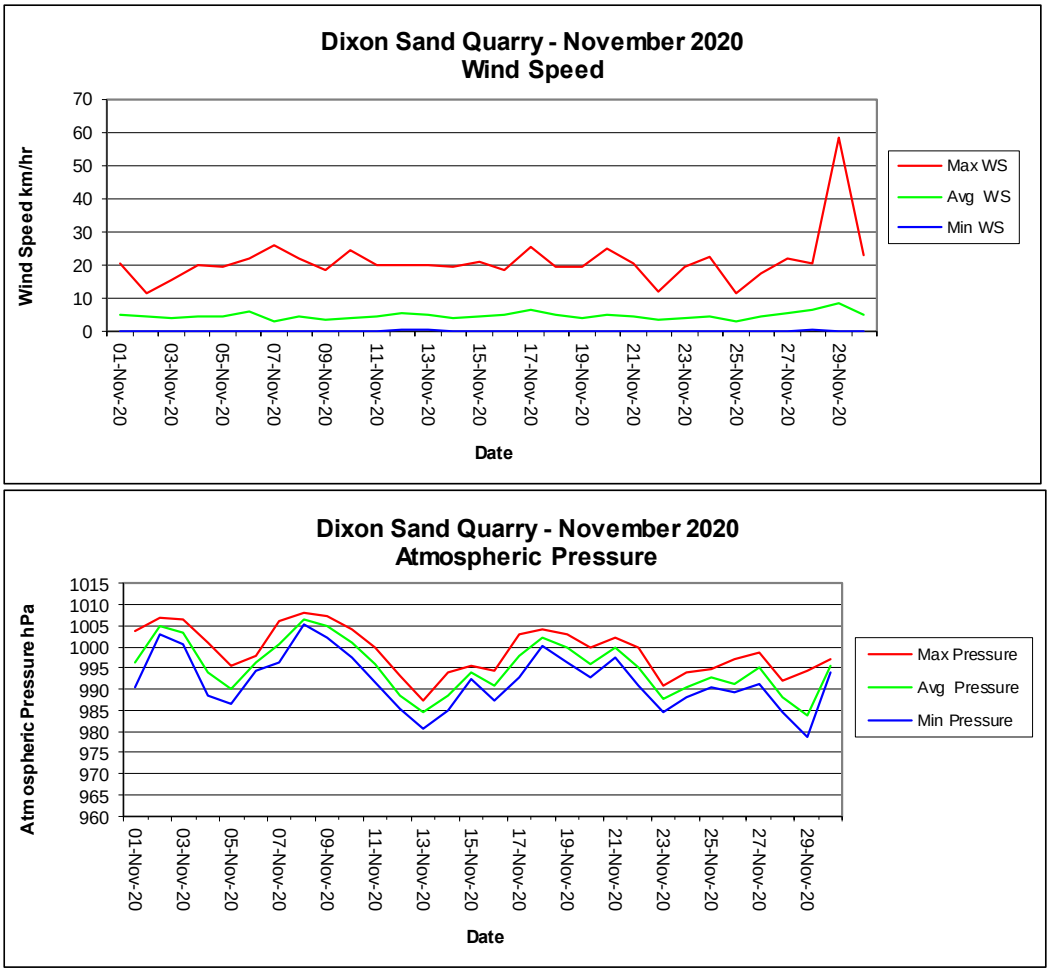
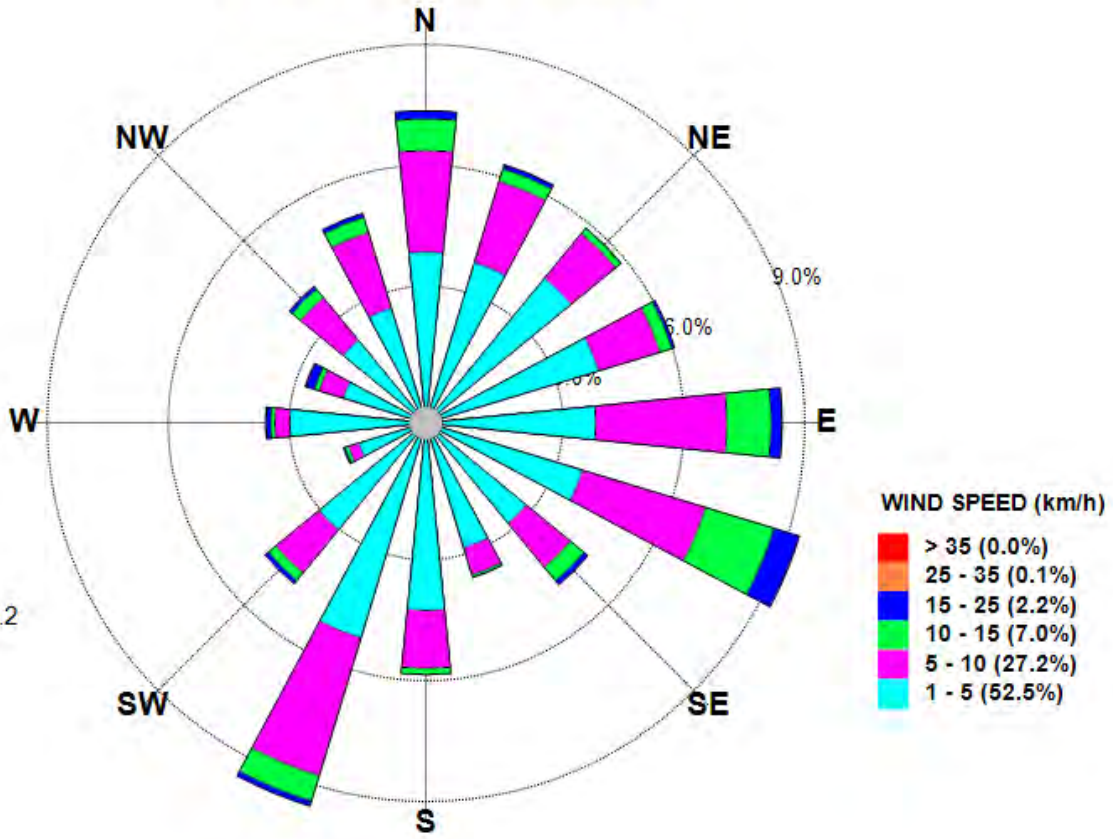


Figure 3: *Wind Speed and Atmospheric Pressure Charts*

Dixon Sand Quarry - Windrose

NOVEMBER 2020



Calms %: 11.0
Average Windspeed (km/h): 4.7
Maximum Windspeed (km/h): 58.2
Prevailing Wind Direction: 202.5

Appendix 1

Calibration Documents (when required)

CARBON BASED ENVIRONMENTAL

Continuous Air Quality
Monthly/Quarterly/Six Monthly/Annual
TEOM Maintenance and Calibration – 1400AB

teledata

TEOM Client/Site: Dixon Ba-ll / TEOM **Date:** 10·12·20 / 11/12/20.

1. TEOM Data Screen **SERIAL No:** 25570 **Firmware:** AB

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	OK ✓	Green - Normal	✓	
Date/time	TEOM: 6-23 8/12/20 Actual: 10/12/20 14-22	Current Date/time correct within 5 minutes		✓
PM-10 24hr av	26.0	Positive values	✓	
Filter loading PM10	34%	<80 %		
Frequency PM-10	252.06903	200-300 Hz		
Noise PM-10	0.022	<0.100ug		

Comment: If filter load >80% but <90% and if flows Ok then data is OK

Comments: smokey, fire ready., reset time OK ✓

2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure		<0.50 atm		
Warnings	NIL	No Warnings	✓	
If any warnings list:				

Comments:

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DAMEN **Signed**

3. Instrument Conditions Ambient Conditions and Temperatures

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	26.7	-10 to 50 C	✓	
Ambient Dew Point	NM	-10 to 50 C	—	
Ambient Pressure	0.976	0.9-1.1 atm	✓	
Ambient Relative Humidity	NM	10-100 %RH	—	
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

4. Instrument Conditions – Flows

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.67	12.95 – 14.39 lpm	✓	
Total Flow rate	16.67	15.67 – 17.67 lpm	✓	

Comments:

Results: (Tick box)

☑ **There were NO equipment faults found. No action required – (file report)**

☐ **There were faults found (Fails) – Were these fixed on site: YES/NO (circle)**
Any Fails that cannot be repaired on site must be reported to CBased:
Office: 65713334 or email cbased@bigpond.com
Date faults notified to CBased: _____

Comments/Action Required:

Calibration/Maintenance

1. 1405A: Were Filters replaced YES/NO
2. PM10 Inlet head cleaned YES/NO
3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	31	254.99139	254.99140	254.99142	254.99143

✓ good.

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)
Pass/Fail – if Fail – install new filter and redo stability test.

zero filter on

Total Mass 0.67
mass conc 13-0 falling...

4. Instrument clock verified (Refer Section 1) YES/NO.
If Time changed – clock reset OK YES/NO or NA (not changed)
Comments: changed time/date OK.

5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary. YES/NO.
Comments if changed:

6. TEOM Cleaned and Air Conditioner checked YES/NO. Air Conditioner settings or operational status: 5 low cool ✓ OK

Tetracal Flow/Temp/Pressure Calibrator Serial No: 1009 **Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.**

Quarterly or Six Monthly Calibration

1. Flow Verification – Conducted YES/NO

PM10 Flow verified Flow l/min 3.00 Error % 0.0 (allowed error <6%) PASS/FAIL

Bypass Flow verified Flow l/min 13.65 Error % 0.0 (allowed error <6%) PASS/FAIL
If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:** Good flows ✓

2. Leak Check – Conducted YES/NO

PM10 actual 0.13 < Limit 0.15

Bypass actual 0.55 < Limit 0.60

Leak check PASS/FAIL – If fail then find leak and retest.
Comments: Just PM1 – leak in mass transducer but cannot fix onsite OK for now.

Annual Calibration/Maintenance

1. Temperature and Pressure Calibration – Conducted YES/NO
Reference Temperature: 27.1 C TEOM Temperature 26.7 C
if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: 0.977 atm TEOM Pressure 0.975 atm
if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO
ok

Note: Tetracal measures Atmospheric Pressure in mm Hg or mb or hPa
For mb or hPa divide tetracal result by 1013.25 to change units to atm.
For mmHg divide tetracal result by 760 to change units to atm.

2. Flow Calibration – Conducted YES/NO
PM10
Set point 2.4 Actual:_____ NA
Set point 3.6 Actual:_____
Set point 3.0 Actual:_____ After calibration Final:_____l/min

Hardware Cal.

Ref
P = 742.5 mm Hg
T = 27.0 °C
P = 0.977 atm
initial + final same.
Fadj Main 1.050
Fadj byp 1.020
AUX.

BYPASS
Set point 10.9 Actual:_____ NM
Set point 16.4 Actual:_____
Set point 13.67 Actual:_____ After calibration Final:_____l/min

3. Mass calibration (K0) Verification – Conducted YES/NO
Actual measured K0 = 13915 TEOM stated K0 13748 Error %: 1.2
Allowed Error +/- 2.5%. PASS/FAIL
If Error +/- 2.5% repeat. If confirmed consult manufacturer.
Second Error % =_____ PASS/FAIL. Comments: NA
If second test fails consult manufacturer.

good

4. Annual Noise check - Conducted YES/NO
Zero filter applied to TEOM and TEOM operated for at least 12 hours:
Start date/time: 10/12 16:00 Finish date/time: 11/12 11:00
Standard deviation of all recorded data (min 30 min averages) = _____ ug/m^3
Noise was less than 5ug/m^3 YES/NO FAILED zero noise check → unstable
valve may repeat next quarterly cal
→ New filter results look good.?

5. Maintenance
Air Inlet system cleaned YES/NO
Pump Reconditioned YES/NO
Check Waterproofing YES/NO ok
Comments:

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

December 2020

Amendment 1



Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for December 2020 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from 1 July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for December 2020.

Approximately 100% of TEOM data was recovered for December 2020.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration, originally scheduled for November, was actually conducted on 10-11 December 2020 and the next calibration (annual) is scheduled for February 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for December 2020 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/12/2020	27.8	13.7	69.6	34.3
2/12/2020	No Valid Data	13.7	No Valid Data	34.3
3/12/2020	10.4	13.7	26.1	34.3
4/12/2020	15.4	13.7	38.5	34.3
5/12/2020	25.2	13.8	63.0	34.5
6/12/2020	11.6	13.8	29.0	34.4
7/12/2020	20.6	13.8	51.5	34.5
8/12/2020	11.5	13.8	28.8	34.5
9/12/2020	19.3	13.8	48.3	34.6
10/12/2020	No Valid Data	13.8	No Valid Data	34.6
11/12/2020	No Valid Data	13.8	No Valid Data	34.6
12/12/2020	8.4	13.8	21.0	34.5
13/12/2020	10.4	13.8	26.0	34.4
14/12/2020	11.5	13.8	28.8	34.4
15/12/2020	6.2	13.7	15.5	34.3
16/12/2020	9.3	13.7	23.3	34.2
17/12/2020	11.0	13.7	27.5	34.2
18/12/2020	12.8	13.7	32.0	34.2
19/12/2020	10.8	13.7	27.0	34.1
20/12/2020	7.4	13.6	18.5	34.0
21/12/2020	8.2	13.6	20.5	34.0
22/12/2020	6.8	13.5	17.0	33.9
23/12/2020	11.4	13.5	28.5	33.8
24/12/2020	15.3	13.5	38.3	33.9
25/12/2020	15.8	13.6	39.5	33.9
26/12/2020	9.6	13.5	24.0	33.8
27/12/2020	10.3	13.5	25.8	33.8
28/12/2020	16.0	13.5	40.0	33.8
29/12/2020	9.4	13.5	23.5	33.8
30/12/2020	9.9	13.5	24.8	33.7
31/12/2020	15.9	13.5	39.8	33.8

*Calculated from PM10

**Calculated from PM10 Annual Average

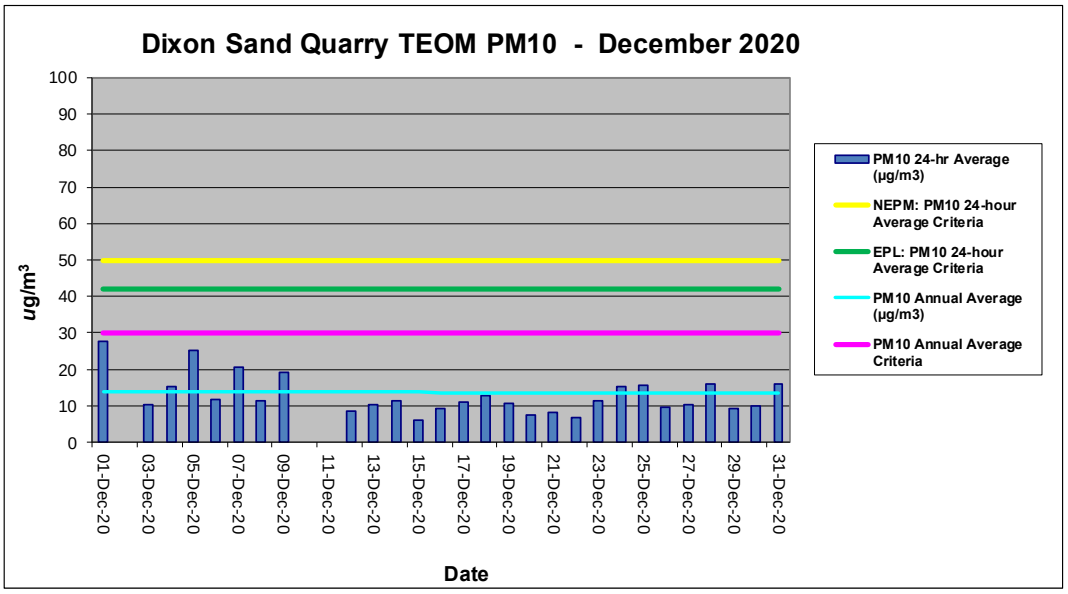


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for December 2020

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/12/2020	16.1	23.7	36.6	0.0	0.0	4.8	40.5	32.9	66.8	94.4	983.3	990.7	995.8
2/12/2020	16.0	18.6	22.9	0.0	0.5	6.2	18.5	62.9	84.9	100.0	997.7	1000.4	1004.0
3/12/2020	15.7	17.6	19.2	1.4	0.4	3.6	11.5	83.0	97.2	100.0	996.3	999.9	1004.4
4/12/2020	17.2	23.3	34.2	0.2	0.1	3.7	17.6	11.5	65.4	100.0	989.2	992.7	996.5
5/12/2020	16.7	20.0	23.5	14.2	0.0	3.6	16.4	71.8	90.1	100.0	979.6	988.5	994.2
6/12/2020	18.8	23.4	29.0	0.0	0.1	4.9	23.9	22.8	52.0	99.3	978.8	982.1	986.7
7/12/2020	16.9	22.4	28.5	0.0	0.2	4.2	28.9	25.1	38.0	49.9	981.7	984.3	986.2
8/12/2020	13.1	17.3	23.7	0.0	0.1	5.7	28.0	21.8	49.8	73.7	985.7	991.8	997.9
9/12/2020	11.8	18.4	26.0	0.0	0.1	3.6	19.8	31.0	60.5	91.8	994.1	996.9	999.5
10/12/2020	14.3	19.1	28.6	0.0	0.2	4.8	22.6	29.5	73.4	99.0	994.7	998.2	1004.8
11/12/2020	13.5	16.2	19.6	1.0	0.5	4.2	20.5	48.2	76.2	100.0	1004.0	1006.2	1008.3
12/12/2020	14.2	17.4	21.9	0.4	0.6	6.3	28.2	42.2	67.2	92.5	1005.3	1007.0	1009.1
13/12/2020	13.2	17.4	22.2	0.2	0.1	4.9	21.1	51.4	82.2	100.0	1000.8	1003.3	1006.0
14/12/2020	16.1	18.8	22.4	2.2	0.1	4.6	22.4	64.9	89.7	100.0	997.2	998.9	1001.6
15/12/2020	17.4	19.7	22.1	13.0	0.2	5.0	23.6	99.2	100.0	100.0	991.6	994.5	997.7
16/12/2020	20.8	22.7	28.3	10.2	0.0	4.3	20.1	63.9	97.5	100.0	986.8	989.8	992.4
17/12/2020	19.6	24.6	31.1	1.4	0.2	4.6	18.0	51.6	84.2	100.0	983.6	986.0	988.0
18/12/2020	19.3	23.8	28.8	6.6	0.4	4.9	12.8	59.2	88.0	100.0	984.3	987.1	992.6
19/12/2020	16.5	17.2	19.3	7.4	0.1	3.9	13.0	100.0	100.0	100.0	992.6	995.3	997.0
20/12/2020	16.1	18.0	21.7	2.2	0.1	3.9	10.6	93.1	99.7	100.0	990.4	992.3	994.8
21/12/2020	16.9	18.2	21.1	20.2	0.1	2.4	10.8	99.2	99.8	100.0	984.3	989.8	992.6
22/12/2020	16.7	20.9	26.2	4.0	0.3	3.8	18.4	32.5	70.2	100.0	980.1	983.2	988.3
23/12/2020	13.1	19.1	25.0	0.0	0.0	4.3	23.1	43.5	80.9	100.0	987.8	993.1	997.7
24/12/2020	16.0	21.1	27.6	0.0	0.2	4.5	17.8	42.2	75.9	100.0	990.8	994.5	997.5
25/12/2020	15.4	17.8	20.4	2.2	0.2	4.5	17.4	77.3	95.7	100.0	994.3	998.0	1000.7
26/12/2020	14.5	17.7	22.9	2.4	0.3	4.2	22.2	66.3	91.7	100.0	994.0	997.4	1000.3
27/12/2020	15.5	22.9	32.2	0.0	0.3	4.2	18.7	24.6	74.4	100.0	986.6	990.5	994.8
28/12/2020	15.5	22.8	32.1	15.2	0.6	7.2	25.9	34.7	70.0	100.0	984.4	987.9	993.4
29/12/2020	14.9	16.3	18.4	9.4	0.2	3.5	12.5	99.2	99.9	100.0	989.9	993.6	996.9
30/12/2020	15.3	17.3	20.4	19.2	0.1	4.6	16.0	82.6	97.9	100.0	995.4	997.6	999.1
31/12/2020	16.5	18.6	21.8	0.0	0.2	3.6	17.1	71.0	93.1	100.0	996.7	998.8	1000.4
Monthly	11.8	19.7	36.6	133.0	0.0	4.5	40.5	11.5	81.0	100.0	978.8	993.9	1009.1

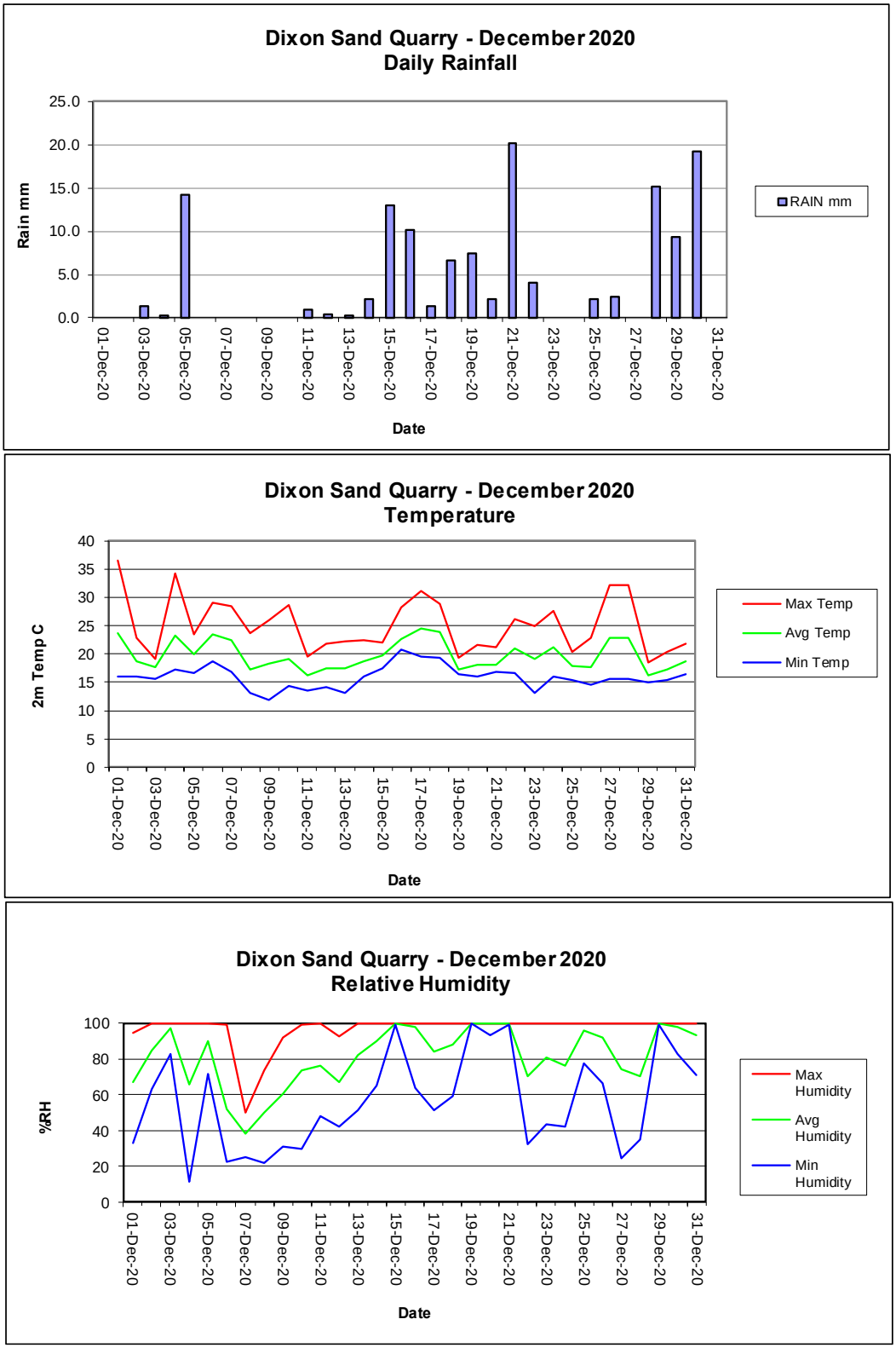


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

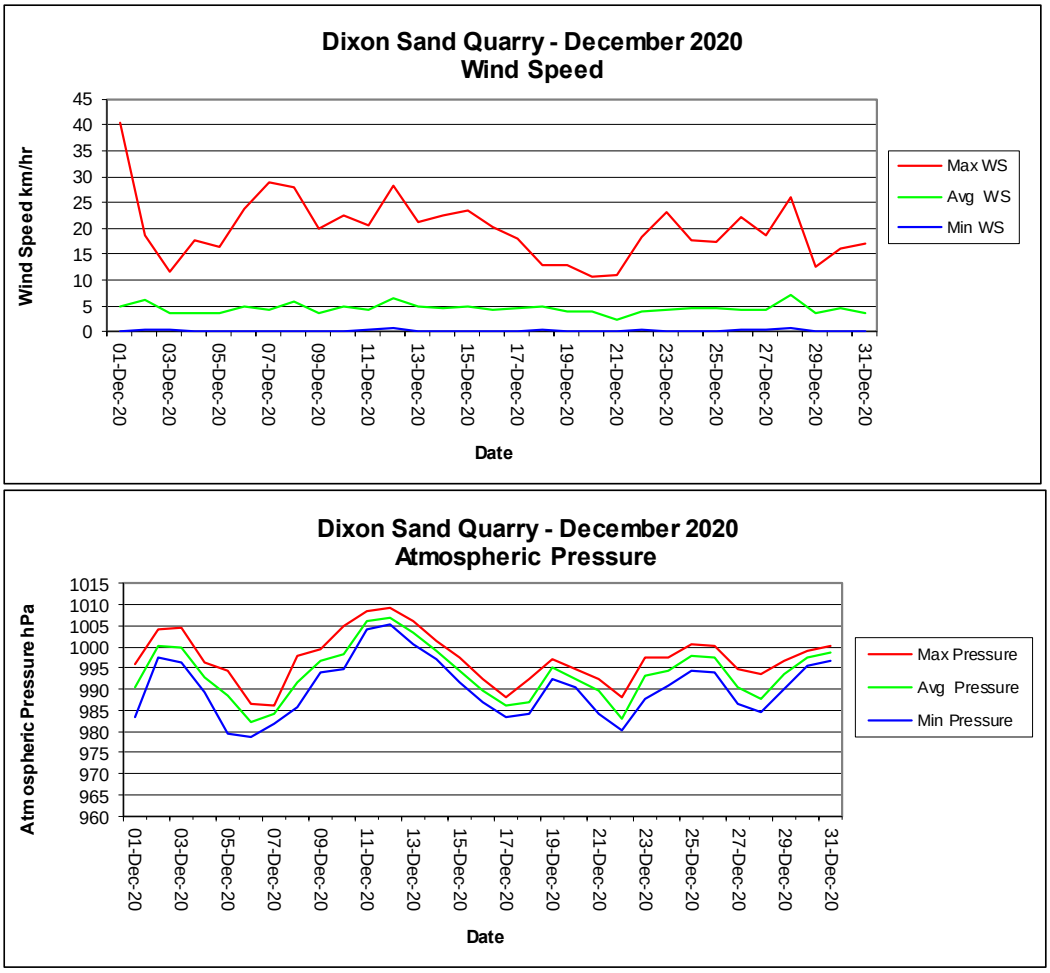
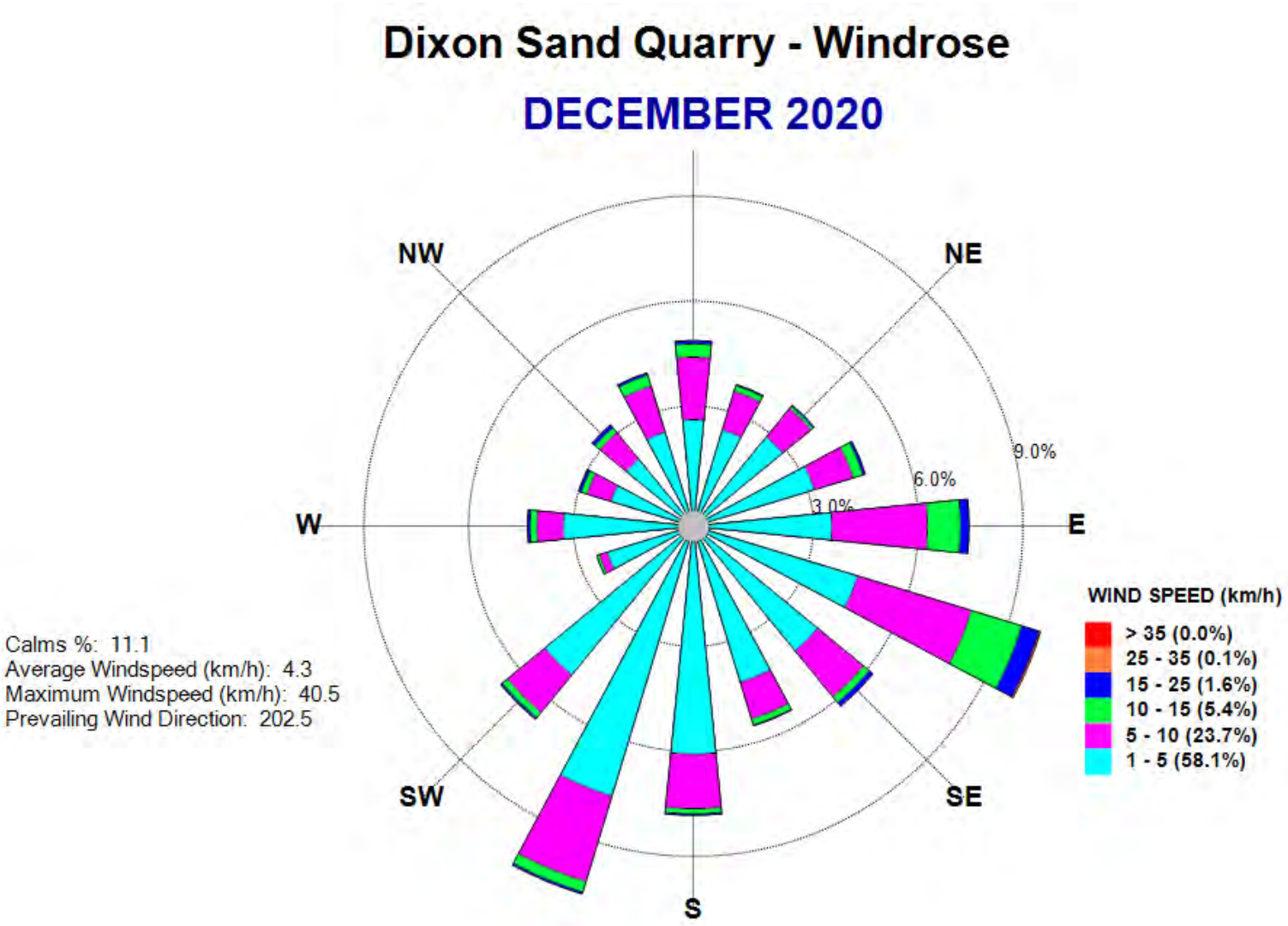


Figure 3: *Wind Speed and Atmospheric Pressure Charts*


Dixon Sand Quarry - Windrose
DECEMBER 2020
NW
NE
W
E
SW
SE
S
3.0%
6.0%
9.0%
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.1%)
15 - 25 (1.6%)
10 - 15 (5.4%)
5 - 10 (23.7%)
1 - 5 (58.1%)
Calms %: 11.1
Average Windspeed (km/h): 4.3
Maximum Windspeed (km/h): 40.5
Prevailing Wind Direction: 202.5

Appendix 1

Calibration Documents (when required)

CARBON BASED ENVIRONMENTAL

Continuous Air Quality
Monthly/Quarterly/Six Monthly/Annual
TEOM Maintenance and Calibration – 1400AB

teledata

TEOM Client/Site: Dixon Ba-ll / TEOM **Date:** 10·12·20 / 11/12/20.

1. TEOM Data Screen **SERIAL No:** 25570 **Firmware:** AB

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	OK ✓	Green - Normal	✓	
Date/time	TEOM: 6-23 8/12/20 Actual: 10/12/20 14-22	Current Date/time correct within 5 minutes		✓
PM-10 24hr av	26.0	Positive values	✓	
Filter loading PM10	34%	<80 %		
Frequency PM-10	252.06903	200-300 Hz		
Noise PM-10	0.022	<0.100ug		

Comment: If filter load >80% but <90% and if flows Ok then data is OK

Comments: smokey, fire ready., reset time OK ✓

2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure		<0.50 atm		
Warnings	NIL	No Warnings	✓	
If any warnings list:				

Comments:

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DAMEN **Signed**

3. Instrument Conditions Ambient Conditions and Temperatures

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	26.7	-10 to 50 C	✓	
Ambient Dew Point	NM	-10 to 50 C	—	
Ambient Pressure	0.976	0.9-1.1 atm	✓	
Ambient Relative Humidity	NM	10-100 %RH	—	
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

4. Instrument Conditions – Flows

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.67	12.95 – 14.39 lpm	✓	
Total Flow rate	16.67	15.67 – 17.67 lpm	✓	

Comments:

Results: (Tick box)

☑ **There were NO equipment faults found. No action required – (file report)**

☐ **There were faults found (Fails) – Were these fixed on site: YES/NO (circle)**
Any Fails that cannot be repaired on site must be reported to CBased:
Office: 65713334 or email cbased@bigpond.com
Date faults notified to CBased: _____

Comments/Action Required:

Calibration/Maintenance

1. 1405A: Were Filters replaced YES/NO
2. PM10 Inlet head cleaned YES/NO
3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	31	254.99139	254.99140	254.99142	254.99143

✓ good.

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)
Pass/Fail – if Fail – install new filter and redo stability test.

zero filter on

Total Mass 0.67
mass conc 13-0 falling...

4. Instrument clock verified (Refer Section 1) YES/NO.
If Time changed – clock reset OK YES/NO or NA (not changed)
Comments: changed time/date OK.

5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary. YES/NO.
Comments if changed:

6. TEOM Cleaned and Air Conditioner checked YES/NO. Air Conditioner settings or operational status: 5 low cool ✓ OK

Tetracal Flow/Temp/Pressure Calibrator Serial No: 1009 **Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.**

Quarterly or Six Monthly Calibration

1. Flow Verification – Conducted YES/NO

PM10 Flow verified Flow l/min 3.00 Error % 0.0 (allowed error <6%) PASS/FAIL

Bypass Flow verified Flow l/min 13.65 Error % 0.0 (allowed error <6%) PASS/FAIL
If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:** Good flows ✓

2. Leak Check – Conducted YES/NO

PM10 actual 0.13 < Limit 0.15

Bypass actual 0.55 < Limit 0.60

Leak check PASS/FAIL – If fail then find leak and retest.
Comments: Just PM1 – leak in mass transducer but cannot fix onsite OK for now.

Annual Calibration/Maintenance

1. Temperature and Pressure Calibration – Conducted YES/NO
Reference Temperature: 27.1 C TEOM Temperature 26.7 C
if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: 0.977 atm TEOM Pressure 0.975 atm
if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO
ok

Note: Tetracal measures Atmospheric Pressure in mm Hg or mb or hPa
For mb or hPa divide tetracal result by 1013.25 to change units to atm.
For mmHg divide tetracal result by 760 to change units to atm.

2. Flow Calibration – Conducted YES/NO
PM10
Set point 2.4 Actual:_____ NA
Set point 3.6 Actual:_____
Set point 3.0 Actual:_____ After calibration Final:_____l/min

Hardware Cal.

Ref
P = 742.5 mm Hg
T = 27.0 °C
P = 0.977 atm
initial + final same.
Fadj Main 1.050
Fadj byp 1.020
AUX.

BYPASS
Set point 10.9 Actual:_____ NM
Set point 16.4 Actual:_____
Set point 13.67 Actual:_____ After calibration Final:_____l/min

3. Mass calibration (K0) Verification – Conducted YES/NO
Actual measured K0 = 13915 TEOM stated K0 13748 Error %: 1.2
Allowed Error +/- 2.5%. PASS/FAIL
If Error +/- 2.5% repeat. If confirmed consult manufacturer.
Second Error % =_____ PASS/FAIL. Comments: NA
If second test fails consult manufacturer.

good

4. Annual Noise check - Conducted YES/NO
Zero filter applied to TEOM and TEOM operated for at least 12 hours:
Start date/time: 10/12 16:00 Finish date/time: 11/12 11:00
Standard deviation of all recorded data (min 30 min averages) = _____ ug/m^3
Noise was less than 5ug/m^3 YES/NO FAILED zero noise check → unstable
valve may repeat next quarterly cal
→ New filter results look good.?

5. Maintenance
Air Inlet system cleaned YES/NO
Pump Reconditioned YES/NO
Check Waterproofing YES/NO ok
Comments:

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

January 2021
Amendment 1

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for January 2021 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from 1 July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for January 2021.

Approximately 100% of TEOM data was recovered for January 2021.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration, originally scheduled for November, was actually conducted in December 2020 with the next calibration (annual) scheduled for February 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for January 2021 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/01/2021	11.6	13.5	29.0	33.7
2/01/2021	11.5	13.5	28.8	33.7
3/01/2021	10.8	13.5	27.0	33.7
4/01/2021	10.3	13.4	25.6	33.6
5/01/2021	14.4	13.5	36.0	33.6
6/01/2021	12.1	13.4	30.3	33.6
7/01/2021	9.6	13.4	24.0	33.6
8/01/2021	12.5	13.4	31.3	33.6
9/01/2021	10.3	13.4	25.8	33.5
10/01/2021	7.0	13.4	17.5	33.4
11/01/2021	12.0	13.4	30.0	33.4
12/01/2021	18.0	13.4	45.0	33.5
13/01/2021	12.2	13.4	30.5	33.5
14/01/2021	21.6	13.4	54.0	33.6
15/01/2021	32.4	13.5	80.9	33.8
16/01/2021	17.2	13.5	43.0	33.8
17/01/2021	16.0	13.6	40.0	33.9
18/01/2021	28.0	13.6	70.0	34.1
19/01/2021	28.6	13.7	71.5	34.2
20/01/2021	14.3	13.7	35.8	34.3
21/01/2021	27.5	13.8	68.8	34.4
22/01/2021	19.7	13.8	49.3	34.5
23/01/2021	24.8	13.9	62.0	34.6
24/01/2021	19.4	13.9	48.5	34.7
25/01/2021	29.6	14.0	74.0	34.9
26/01/2021	16.2	14.0	40.5	34.9
27/01/2021	19.2	14.0	48.0	35.0
28/01/2021	8.4	14.0	21.0	34.9
29/01/2021	6.5	13.9	16.3	34.8
30/01/2021	10.3	13.9	25.8	34.8
31/01/2021	15.1	13.9	37.8	34.8

*Calculated from PM10

**Calculated from PM10 Annual Average

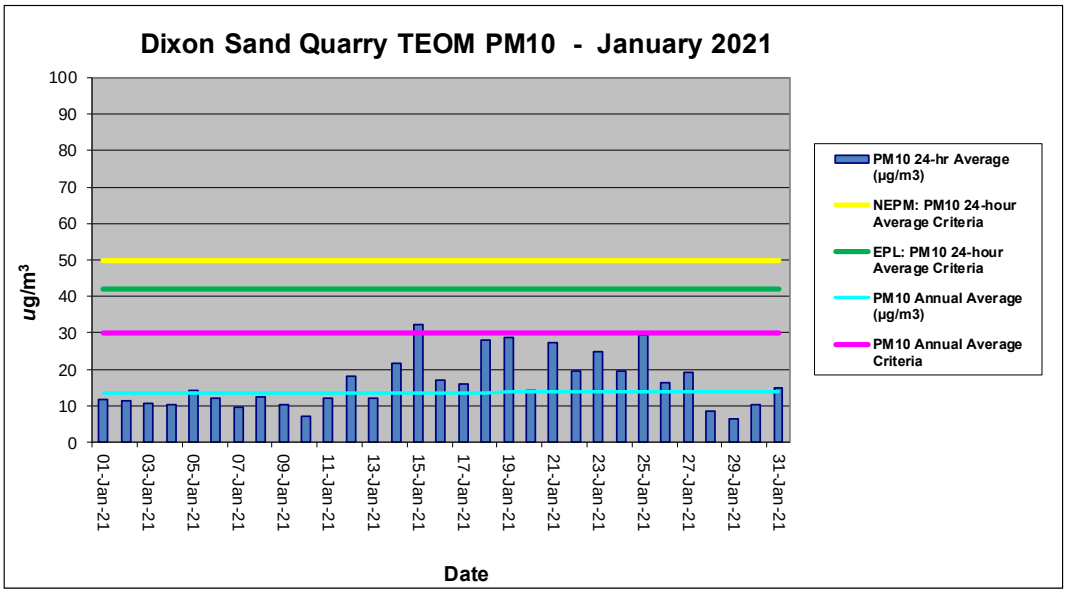


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in February 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for January 2021

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/01/2021	15.0	16.7	18.2	3.4	0.3	3.5	12.0	84.0	97.8	100.0	997.9	999.5	1001.1
2/01/2021	14.5	16.8	19.5	0.0	0.4	3.8	9.7	90.9	99.5	100.0	991.0	994.2	997.9
3/01/2021	17.9	21.0	25.2	0.2	0.0	3.0	14.1	70.0	93.9	100.0	985.5	988.4	991.4
4/01/2021	17.6	20.5	26.8	12.8	0.2	3.8	15.6	88.4	99.8	100.0	984.6	986.4	987.7
5/01/2021	17.2	22.3	29.8	0.0	0.0	4.3	18.0	52.7	88.5	100.0	985.6	987.6	990.1
6/01/2021	16.9	19.9	24.6	0.0	0.3	4.4	19.3	65.6	92.7	100.0	990.0	993.9	997.7
7/01/2021	15.1	17.8	22.5	1.6	0.3	4.4	14.9	58.4	90.7	100.0	996.9	999.7	1002.4
8/01/2021	13.9	16.9	20.8	0.4	0.2	3.6	11.6	62.1	96.4	100.0	1000.4	1002.0	1003.0
9/01/2021	14.1	18.2	23.7	1.6	0.2	4.5	18.9	50.6	83.3	100.0	999.3	1000.9	1002.3
10/01/2021	15.2	20.6	27.0	0.0	0.1	3.7	21.4	47.4	77.3	99.6	997.3	999.3	1000.9
11/01/2021	17.0	21.8	28.4	0.2	0.2	4.4	17.4	36.4	71.8	99.5	993.7	996.8	999.1
12/01/2021	17.0	23.6	32.8	0.0	0.3	4.6	14.8	26.4	70.3	99.2	991.9	993.9	995.5
13/01/2021	17.9	22.9	29.1	0.0	0.1	4.5	18.6	40.1	74.6	100.0	992.9	995.3	997.7
14/01/2021	18.7	25.0	37.1	0.0	0.1	4.3	18.4	21.4	72.9	99.4	984.5	989.0	993.6
15/01/2021	19.4	23.5	30.2	0.0	0.2	4.8	19.2	24.6	74.1	99.2	980.0	984.9	989.3
16/01/2021	15.4	20.4	27.4	0.0	0.5	4.4	17.2	16.2	32.8	62.2	983.9	987.9	991.0
17/01/2021	14.3	19.6	26.8	0.0	0.1	4.3	23.5	29.7	57.9	87.5	991.0	992.9	995.2
18/01/2021	16.6	22.8	30.9	0.0	0.0	4.1	20.6	28.5	67.0	97.0	987.4	991.8	994.9
19/01/2021	15.4	19.2	23.0	0.0	0.0	2.9	11.8	57.4	78.7	99.4	989.9	995.8	1001.4
20/01/2021	14.7	16.9	21.0	1.4	0.0	3.0	11.5	60.8	83.7	100.0	1000.1	1001.2	1003.2
21/01/2021	13.9	20.1	27.3	0.0	0.0	4.1	23.2	33.8	67.2	99.2	991.8	996.3	1000.1
22/01/2021	16.9	24.8	34.3	0.2	0.4	4.9	18.3	24.2	62.0	99.2	986.8	989.7	992.7
23/01/2021	20.4	27.2	33.7	0.0	0.1	5.5	17.8	36.2	56.1	71.2	988.3	990.7	992.8
24/01/2021	20.2	28.2	37.6	0.0	0.1	3.8	23.5	18.6	54.7	99.4	988.0	990.8	992.9
25/01/2021	20.6	27.2	36.1	0.0	0.1	5.6	18.6	20.4	49.8	81.1	983.3	986.7	989.8
26/01/2021	22.3	29.6	37.8	0.0	0.3	5.7	24.3	19.0	47.9	87.4	979.7	982.3	984.9
27/01/2021	17.5	20.4	25.2	3.4	0.1	4.1	12.5	64.6	93.4	100.0	984.7	991.7	997.5
28/01/2021	16.9	17.8	19.4	8.4	0.2	3.6	13.6	90.7	99.5	100.0	996.9	998.8	1000.3
29/01/2021	17.2	19.0	20.4	9.0	0.0	5.5	20.9	99.8	100.0	100.0	992.7	995.7	999.1
30/01/2021	20.2	22.6	26.5	0.4	0.2	3.3	16.7	84.0	99.5	100.0	989.0	991.1	992.8
31/01/2021	18.8	20.5	22.5	0.8	0.0	3.1	12.1	93.5	99.6	100.0	990.6	994.7	997.5
Monthly	13.9	21.4	37.8	43.8	0.0	4.2	24.3	16.2	78.5	100.0	979.7	993.2	1003.2

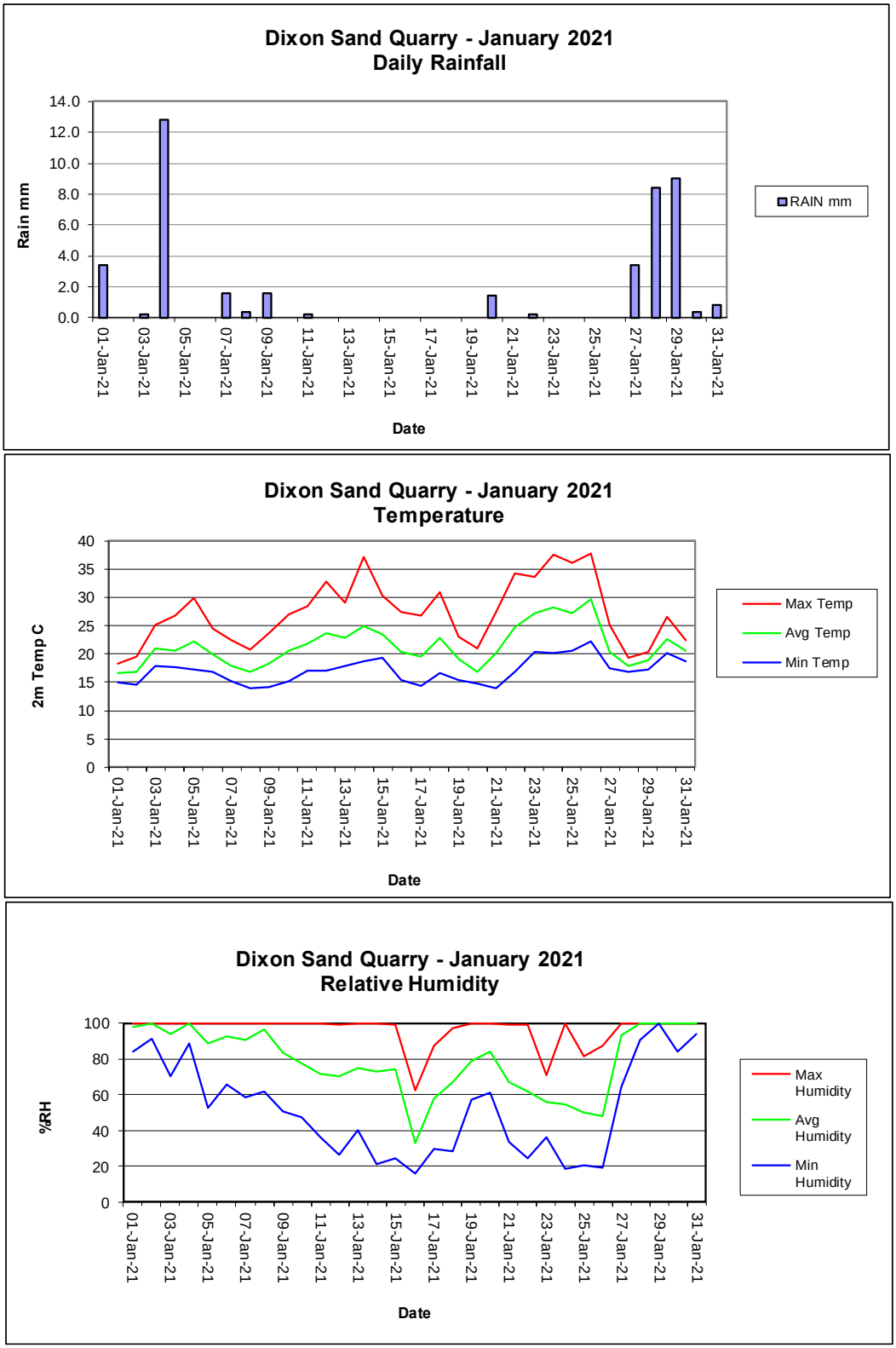


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

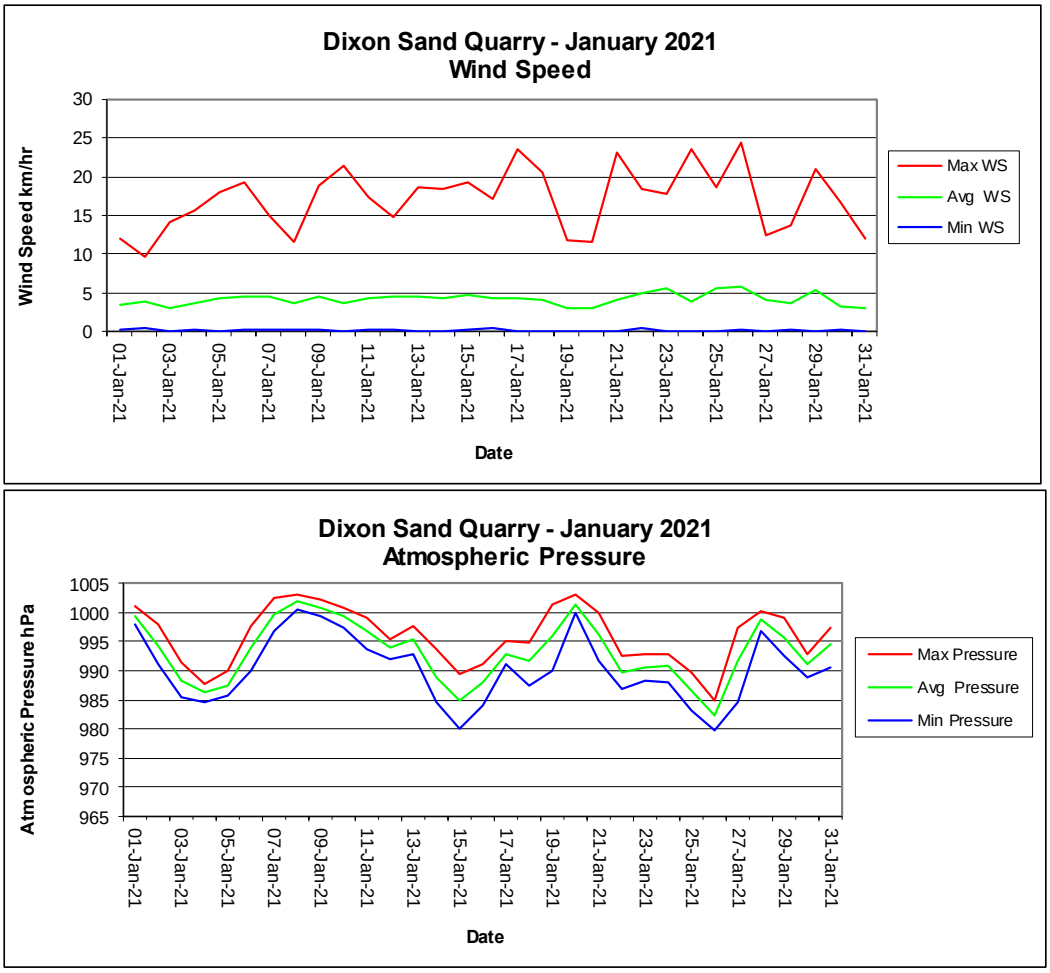
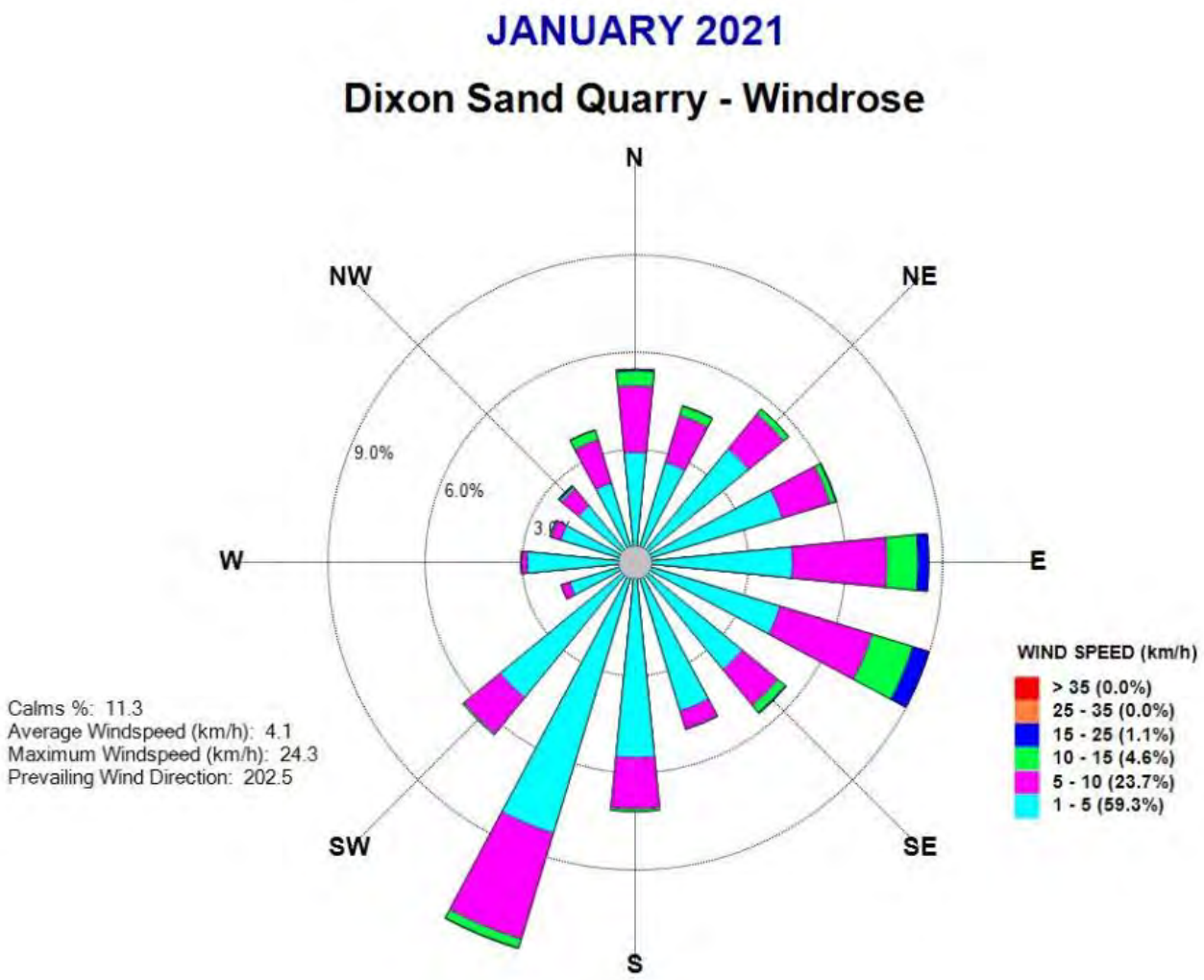


Figure 3: *Wind Speed and Atmospheric Pressure Charts*


JANUARY 2021
Dixon Sand Quarry - Windrose
N
NE
E
SE
S
SW
W
NW
9.0%
6.0%
3.0%
Calms %: 11.3
Average Windspeed (km/h): 4.1
Maximum Windspeed (km/h): 24.3
Prevailing Wind Direction: 202.5
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.0%)
15 - 25 (1.1%)
10 - 15 (4.6%)
5 - 10 (23.7%)
1 - 5 (59.3%)

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

February 2021
Amendment 1

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

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- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
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- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

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Approximately 100% of TEOM data was recovered for February 2021.

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All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration was conducted in December 2020 with the next calibration scheduled for March 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for February 2021 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/02/2021	19.1	13.9	47.8	34.9
2/02/2021	11.1	13.9	27.8	34.8
3/02/2021	17.2	13.9	43.0	34.9
4/02/2021	20.7	14.0	51.8	34.9
5/02/2021	23.5	14.0	58.8	35.1
6/02/2021	12.3	14.0	30.8	35.0
7/02/2021	11.4	14.0	28.5	35.0
8/02/2021	17.0	14.0	42.5	35.0
9/02/2021	15.1	14.0	37.8	35.0
10/02/2021	12.4	14.0	31.0	35.0
11/02/2021	15.0	14.0	37.5	35.0
12/02/2021	17.2	14.0	43.0	35.1
13/02/2021	11.2	14.0	28.0	35.0
14/02/2021	15.3	14.0	38.3	35.1
15/02/2021	15.0	14.0	37.5	35.1
16/02/2021	9.6	14.0	24.0	35.0
17/02/2021	11.1	14.0	27.8	35.0
18/02/2021	16.0	14.0	40.0	35.0
19/02/2021	11.5	14.0	28.8	35.0
20/02/2021	8.8	14.0	22.0	34.9
21/02/2021	8.1	13.9	20.3	34.9
22/02/2021	11.2	13.9	28.0	34.8
23/02/2021	19.0	14.0	47.5	34.9
24/02/2021	14.4	14.0	36.0	34.9
25/02/2021	10.6	13.9	26.5	34.9
26/02/2021	19.8	14.0	49.5	34.9
27/02/2021	18.1	14.0	45.3	35.0
28/02/2021	17.6	14.0	44.0	35.0

*Calculated from PM10

**Calculated from PM10 Annual Average

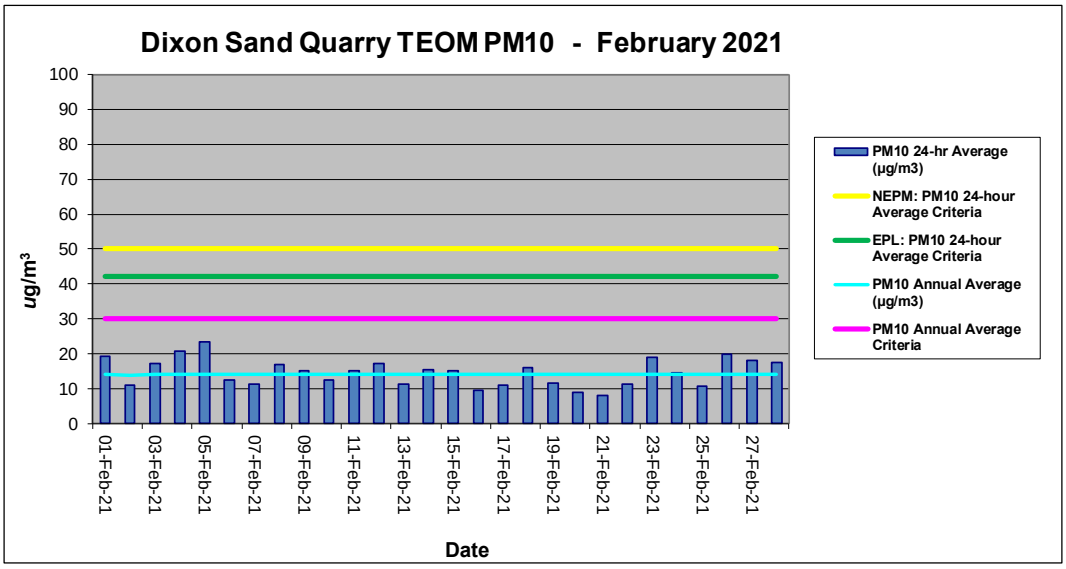


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in February 2020 and is next due in March 2021. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for February 2021

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/02/2021	17.9	21.3	27.1	2.0	0.1	3.7	23.3	60.7	91.6	100.0	987.8	992.9	997.1
2/02/2021	16.4	18.8	23.5	0.0	0.3	4.3	27.6	55.8	85.6	100.0	986.3	990.2	993.7
3/02/2021	15.8	18.9	23.5	0.0	0.0	4.0	15.2	52.9	78.5	100.0	990.6	992.4	993.8
4/02/2021	15.9	21.0	28.3	3.0	0.2	3.9	14.3	53.7	87.9	100.0	988.7	991.0	993.2
5/02/2021	18.0	22.9	28.8	0.0	0.1	5.4	18.2	57.5	88.9	100.0	985.3	989.0	992.0
6/02/2021	19.7	21.8	25.2	0.8	0.0	4.6	18.0	72.9	96.1	99.4	982.1	984.1	987.1
7/02/2021	17.9	22.0	28.8	0.2	0.0	3.8	30.0	35.1	78.6	100.0	983.7	986.5	991.4
8/02/2021	17.0	19.3	23.2	0.2	0.1	3.5	18.6	63.4	85.8	99.3	991.3	993.0	995.3
9/02/2021	16.1	19.1	22.9	0.0	0.0	3.2	19.2	50.0	77.4	100.0	994.1	995.9	997.7
10/02/2021	14.8	18.4	23.5	1.2	0.1	4.5	23.4	56.5	81.9	100.0	993.4	995.5	997.5
11/02/2021	16.4	21.2	28.1	0.0	0.1	4.7	18.1	38.4	66.9	92.2	989.0	992.5	995.3
12/02/2021	16.6	23.1	32.4	0.0	0.3	5.3	22.4	36.9	66.9	100.0	984.6	987.6	990.6
13/02/2021	16.1	19.7	23.4	17.4	0.0	3.7	12.8	85.7	99.3	100.0	985.3	988.9	994.9
14/02/2021	15.1	18.8	24.9	0.0	0.2	3.9	13.2	48.8	78.9	100.0	994.3	995.3	997.2
15/02/2021	14.7	17.9	21.9	1.4	0.1	5.5	21.4	54.0	82.2	100.0	996.2	998.2	1000.1
16/02/2021	16.1	19.5	25.0	3.8	0.4	6.1	24.3	62.0	90.4	100.0	998.6	1000.5	1002.2
17/02/2021	16.4	18.6	22.6	1.4	0.0	5.4	24.4	59.5	87.0	100.0	1001.0	1002.7	1004.0
18/02/2021	16.2	19.1	22.8	1.8	0.0	4.1	20.2	60.9	88.8	100.0	1001.8	1003.1	1004.4
19/02/2021	17.7	21.2	25.6	14.6	0.1	4.6	17.9	66.8	91.0	100.0	996.6	999.3	1002.4
20/02/2021	19.0	21.9	27.3	1.2	0.0	3.3	21.3	64.2	92.5	100.0	992.0	994.7	997.3
21/02/2021	19.3	22.3	28.3	1.0	0.0	3.3	16.9	60.2	90.3	100.0	987.5	990.0	993.1
22/02/2021	18.2	22.3	30.2	0.6	0.0	3.6	15.8	48.3	87.9	100.0	984.1	986.7	989.9
23/02/2021	15.7	17.8	19.6	0.2	0.0	3.6	14.8	62.3	80.7	99.2	989.2	992.9	997.2
24/02/2021	14.2	17.3	21.3	3.4	0.2	3.4	9.3	80.5	95.1	100.0	993.9	996.1	998.2
25/02/2021	16.7	20.3	26.8	0.2	0.0	2.8	15.8	59.3	92.4	100.0	988.0	990.4	993.8
26/02/2021	18.3	22.2	30.1	0.0	0.0	5.0	20.9	38.4	72.3	96.0	987.5	989.8	994.4
27/02/2021	18.2	19.6	22.0	1.0	0.0	2.8	12.1	90.0	98.7	100.0	990.6	992.7	994.4
28/02/2021	18.5	22.1	27.9	0.0	0.0	3.8	17.1	49.2	87.6	100.0	988.9	991.1	993.3
Monthly	14.2	20.3	32.4	55.4	0.0	4.1	30.0	35.1	85.8	100.0	982.1	993.0	1004.4

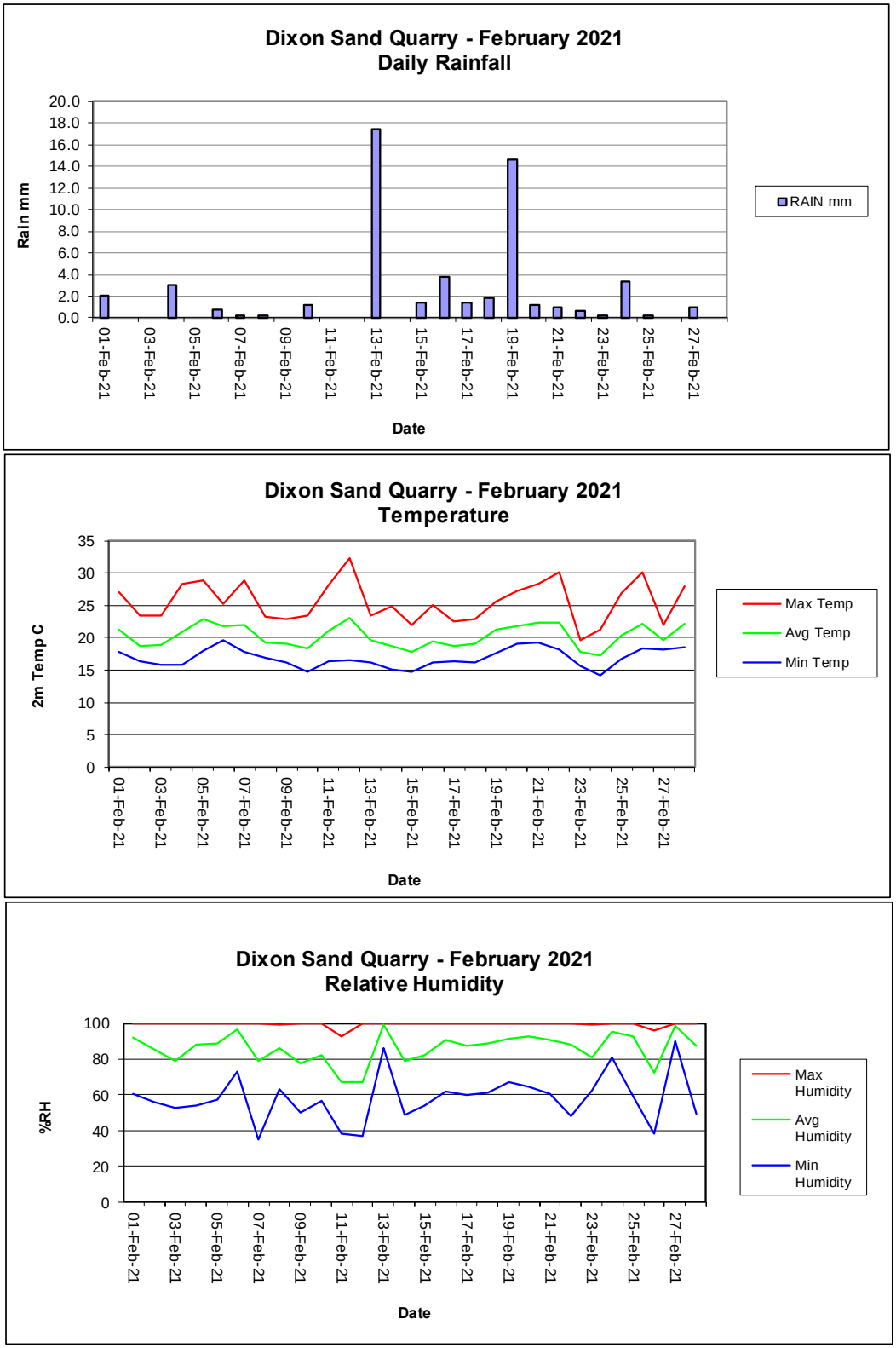


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

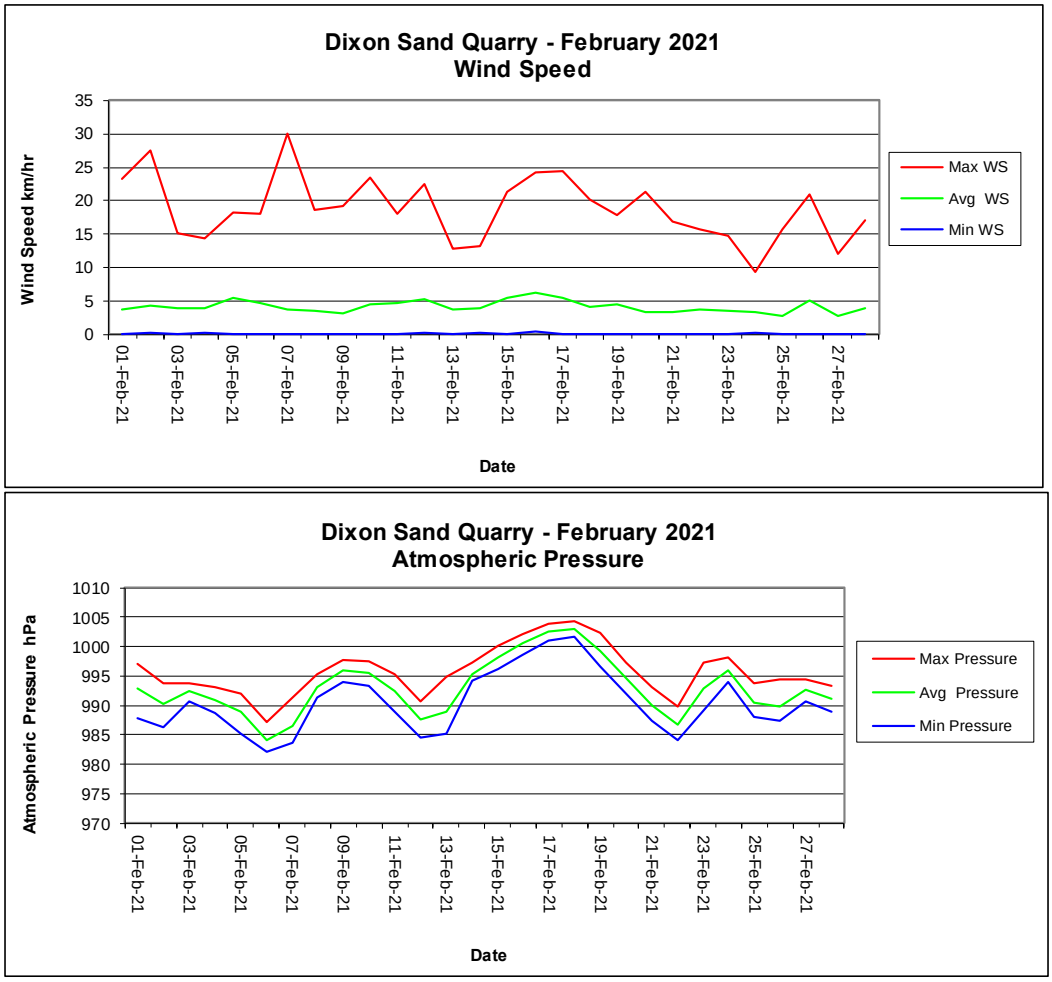
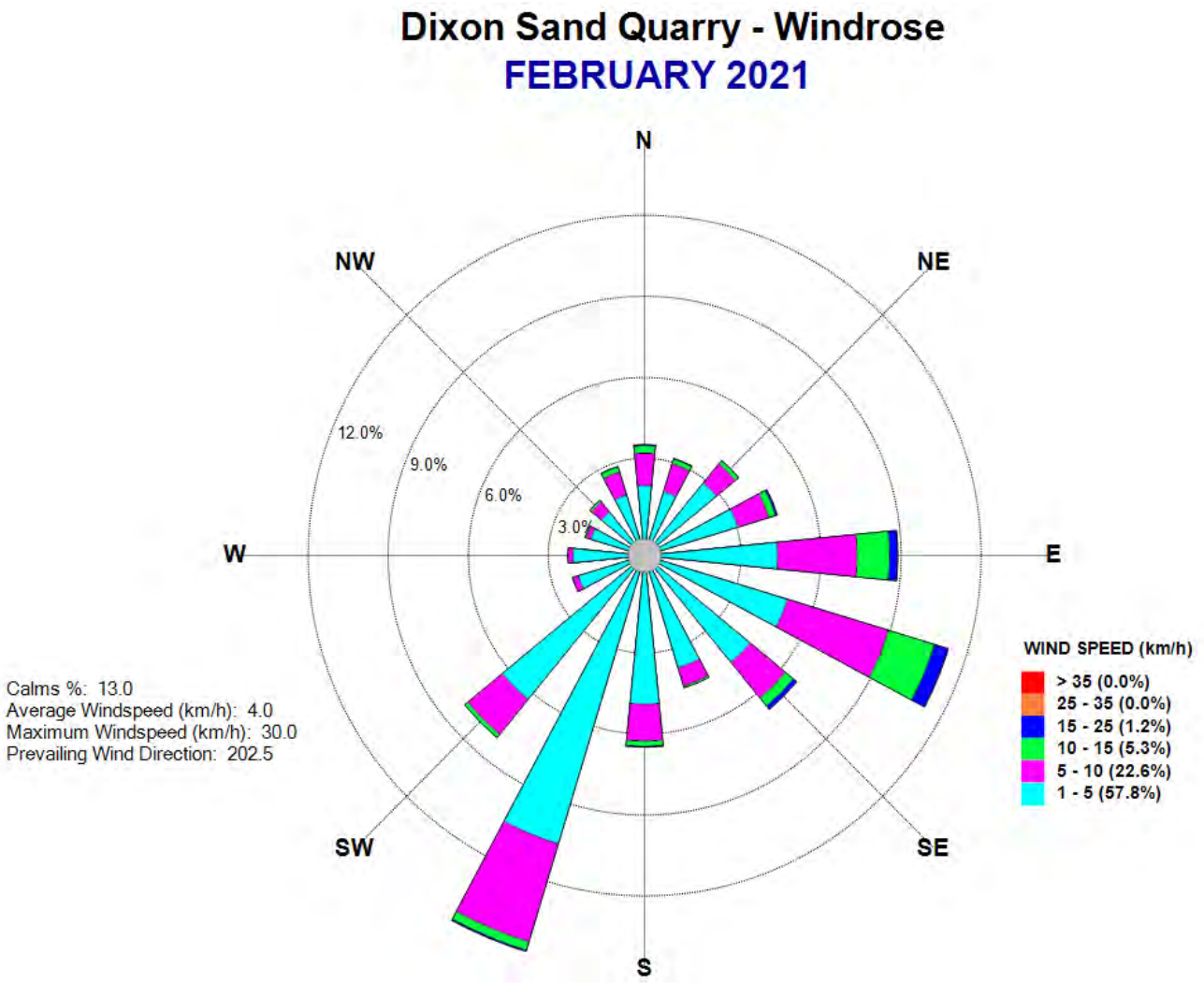


Figure 3: *Wind Speed and Atmospheric Pressure Charts*


Dixon Sand Quarry - Windrose
FEBRUARY 2021
N
NE
E
SE
S
SW
W
NW
12.0%
9.0%
6.0%
3.0%
Calms %: 13.0
Average Windspeed (km/h): 4.0
Maximum Windspeed (km/h): 30.0
Prevailing Wind Direction: 202.5
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.0%)
15 - 25 (1.2%)
10 - 15 (5.3%)
5 - 10 (22.6%)
1 - 5 (57.8%)

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

March 2021
Amendment 1



Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for March 2021 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from 1 July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for March 2021.

Approximately 100% of TEOM data was recovered for March 2021.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration was conducted in on 8 March 2021 with the next calibration scheduled for June 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for March 2021 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/03/2021	15.7	14.0	39.4	35.0
2/03/2021	29.9	14.1	74.8	35.2
3/03/2021	20.2	14.1	50.5	35.2
4/03/2021	17.7	14.1	44.3	35.3
5/03/2021	21.9	14.1	54.8	35.4
6/03/2021	21.7	14.2	54.3	35.4
7/03/2021	19.1	14.2	47.8	35.5
8/03/2021	No Valid Data	14.2	0.0	35.5
9/03/2021	No Valid Data	14.2	0.0	35.5
10/03/2021	18.8	14.2	47.0	35.5
11/03/2021	15.6	14.2	39.0	35.5
12/03/2021	12.4	14.2	31.0	35.5
13/03/2021	9.2	14.2	23.0	35.5
14/03/2021	7.3	14.2	18.3	35.4
15/03/2021	13.3	14.2	33.3	35.4
16/03/2021	12.1	14.2	30.3	35.4
17/03/2021	11.6	14.1	29.0	35.4
18/03/2021	6.3	14.1	15.8	35.3
19/03/2021	13.3	14.1	33.3	35.3
20/03/2021	6.9	14.1	17.3	35.2
21/03/2021	8.3	14.1	20.8	35.1
22/03/2021	5.6	14.0	14.0	35.1
23/03/2021	4.2	14.0	10.5	35.0
24/03/2021	7.5	14.0	18.8	34.9
25/03/2021	10.4	14.0	26.0	34.9
26/03/2021	9.4	13.9	23.5	34.8
27/03/2021	9.4	13.9	23.5	34.8
28/03/2021	10.4	13.9	26.0	34.8
29/03/2021	11.9	13.9	29.8	34.7
30/03/2021	16.2	13.9	40.5	34.8
31/03/2021	16.1	13.9	40.3	34.8

*Calculated from PM10

**Calculated from PM10 Annual Average

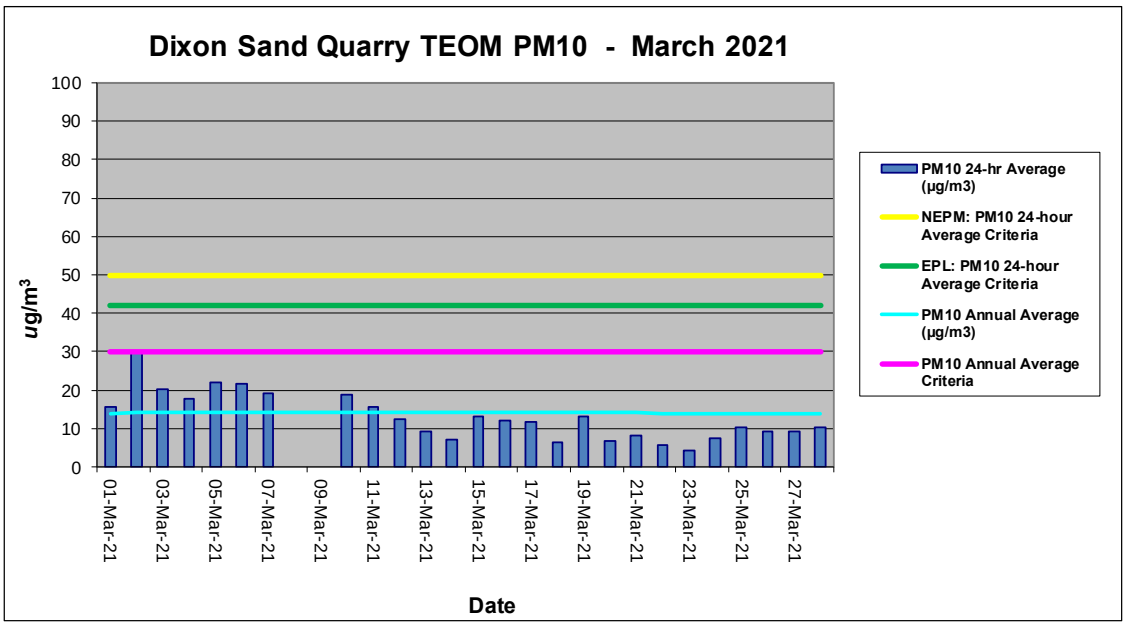


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

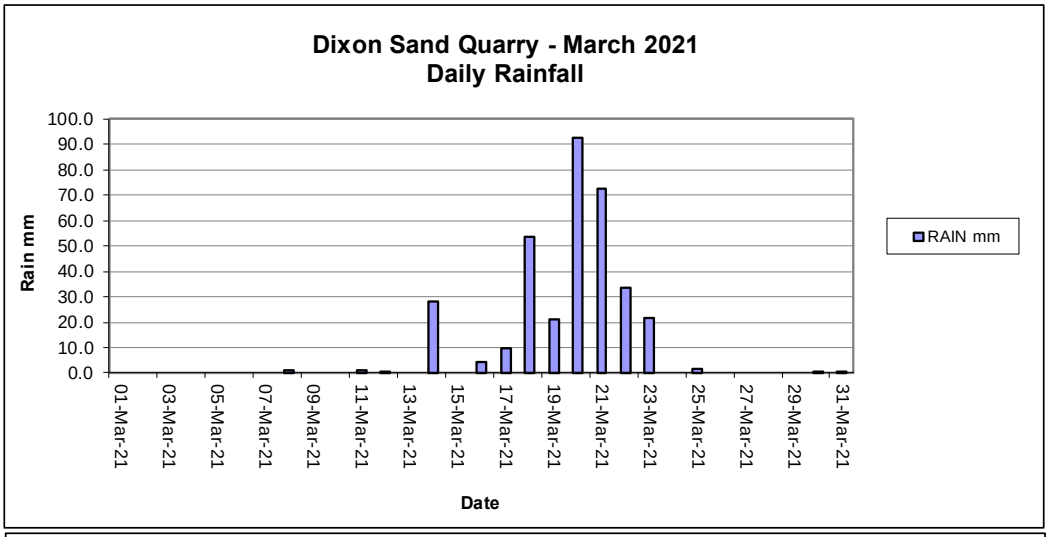
The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

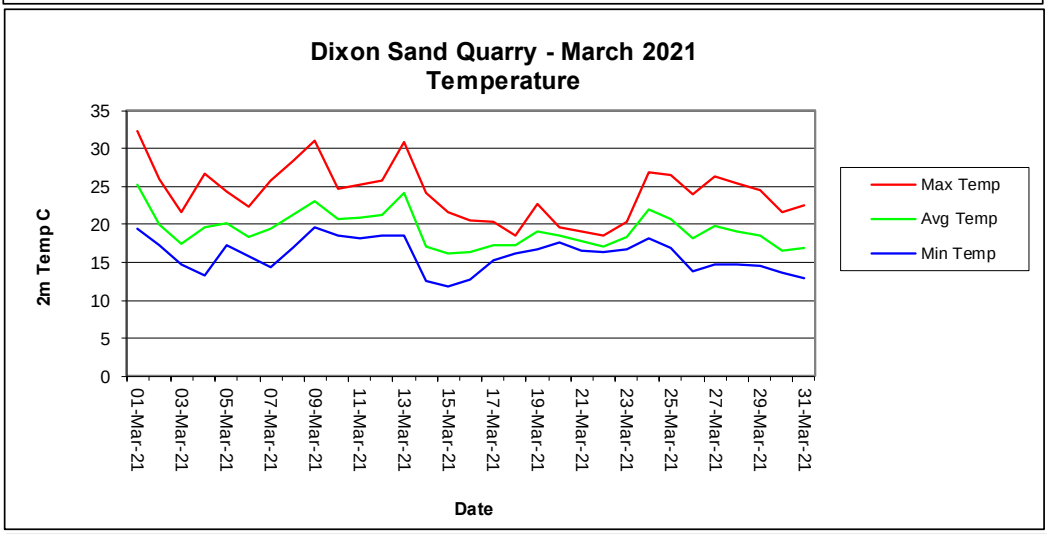
A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted on 8 March 2021 and is next due in February 2022. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for March 2021

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/03/2021	19.5	25.2	32.4	0.0	0.0	3.7	15.3	19.8	66.1	100.0	984.7	988.5	992.1
2/03/2021	17.3	20.0	26.0	0.0	0.0	3.8	23.0	24.1	74.1	99.3	987.2	991.0	994.7
3/03/2021	14.7	17.4	21.7	0.0	0.2	3.4	20.7	54.4	78.0	99.2	993.2	994.5	996.0
4/03/2021	13.2	19.6	26.7	0.0	0.0	3.2	17.8	37.7	68.2	98.0	987.0	991.5	995.4
5/03/2021	17.3	20.1	24.4	0.0	0.2	3.2	16.8	40.2	54.9	67.3	985.2	987.6	991.0
6/03/2021	15.8	18.4	22.4	0.0	0.1	4.2	15.0	48.8	65.7	81.0	990.1	992.0	994.6
7/03/2021	14.4	19.5	25.8	0.0	0.0	3.7	15.6	46.4	70.0	94.4	990.4	993.2	995.4
8/03/2021	16.9	21.3	28.3	0.8	0.6	4.6	21.4	52.0	81.2	99.3	987.8	990.4	992.8
9/03/2021	19.6	23.0	31.1	0.0	0.1	6.2	28.4	29.4	68.7	87.6	988.8	992.0	997.6
10/03/2021	18.5	20.8	24.7	0.0	0.0	4.9	26.5	63.6	81.1	99.4	997.4	999.2	1001.1
11/03/2021	18.1	20.9	25.3	1.0	0.0	3.9	16.4	65.9	82.7	99.3	997.3	999.8	1002.0
12/03/2021	18.5	21.3	25.7	0.4	0.2	2.9	13.6	65.5	90.0	100.0	994.3	996.8	998.8
13/03/2021	18.5	24.1	30.8	0.0	0.2	4.0	15.6	44.7	78.7	100.0	989.4	992.5	995.5
14/03/2021	12.5	17.1	24.2	28.0	0.0	4.8	22.6	72.8	96.5	100.0	988.6	994.1	1000.4
15/03/2021	11.8	16.1	21.7	0.0	0.3	4.8	13.8	49.1	76.3	100.0	999.5	1001.1	1003.6
16/03/2021	12.8	16.5	20.6	4.4	0.1	3.8	16.1	69.4	86.4	100.0	1002.5	1003.6	1005.5
17/03/2021	15.3	17.3	20.4	9.8	0.2	4.6	30.8	70.2	93.9	100.0	1001.6	1003.3	1004.9
18/03/2021	16.2	17.2	18.5	53.6	0.1	3.6	15.5	100.0	100.0	100.0	1001.6	1002.9	1004.4
19/03/2021	16.8	19.1	22.7	21.0	0.1	4.7	22.5	71.0	94.1	100.0	1002.4	1003.7	1005.3
20/03/2021	17.7	18.6	19.7	92.8	0.1	6.2	31.1	99.3	100.0	100.0	999.1	1000.8	1002.8
21/03/2021	16.6	17.8	19.1	72.4	0.0	9.6	31.3	99.2	99.9	100.0	1000.6	1002.3	1003.7
22/03/2021	16.4	17.1	18.6	33.8	0.2	4.4	13.6	99.4	100.0	100.0	996.2	1000.1	1003.0
23/03/2021	16.7	18.3	20.4	21.4	0.1	5.2	15.2	99.2	99.8	100.0	978.9	985.3	996.1
24/03/2021	18.2	22.0	26.8	0.0	0.4	4.5	18.2	39.3	69.7	99.2	978.8	980.0	982.8
25/03/2021	16.9	20.7	26.5	1.8	0.1	3.6	14.5	40.7	59.3	83.8	981.4	984.4	990.4
26/03/2021	13.9	18.2	24.0	0.0	0.0	2.8	10.6	32.3	68.0	99.3	990.4	992.3	994.6
27/03/2021	14.8	19.7	26.4	0.0	0.1	2.3	7.4	35.0	68.8	99.5	990.8	992.5	994.2
28/03/2021	14.8	19.1	25.5	0.0	0.1	3.1	21.7	38.4	65.4	93.6	993.7	995.7	998.3
29/03/2021	14.5	18.5	24.5	0.0	0.0	3.3	17.0	39.0	78.8	100.0	997.2	998.9	1001.8
30/03/2021	13.7	16.6	21.6	0.2	0.3	3.2	11.2	46.9	77.1	99.4	1001.0	1002.2	1003.7
31/03/2021	13.0	17.0	22.6	0.2	0.2	2.7	12.0	41.4	73.1	99.5	1001.6	1002.9	1004.3
Monthly	11.8	19.3	32.4	341.6	0.0	4.2	31.3	19.8	79.6	100.0	978.8	995.3	1005.5





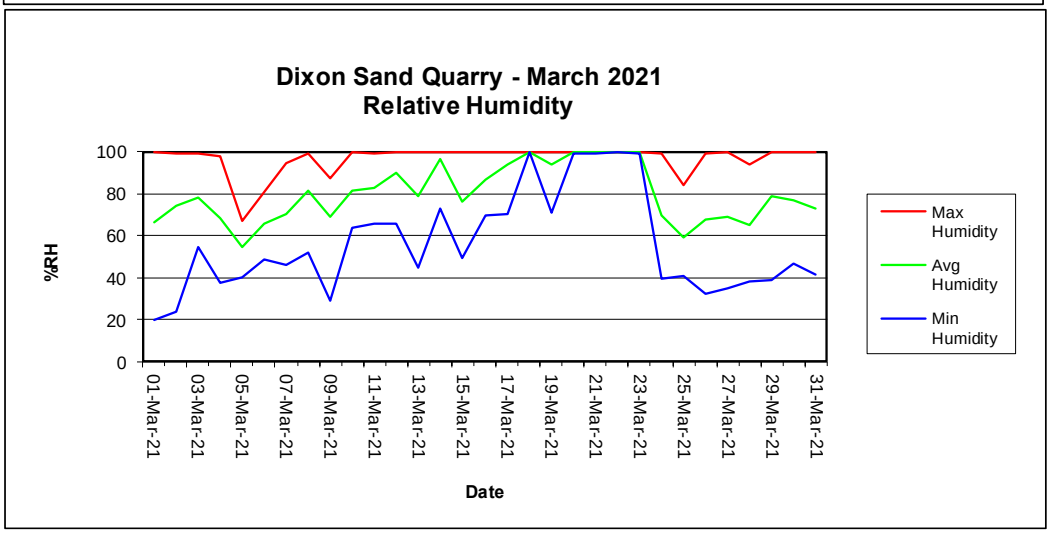
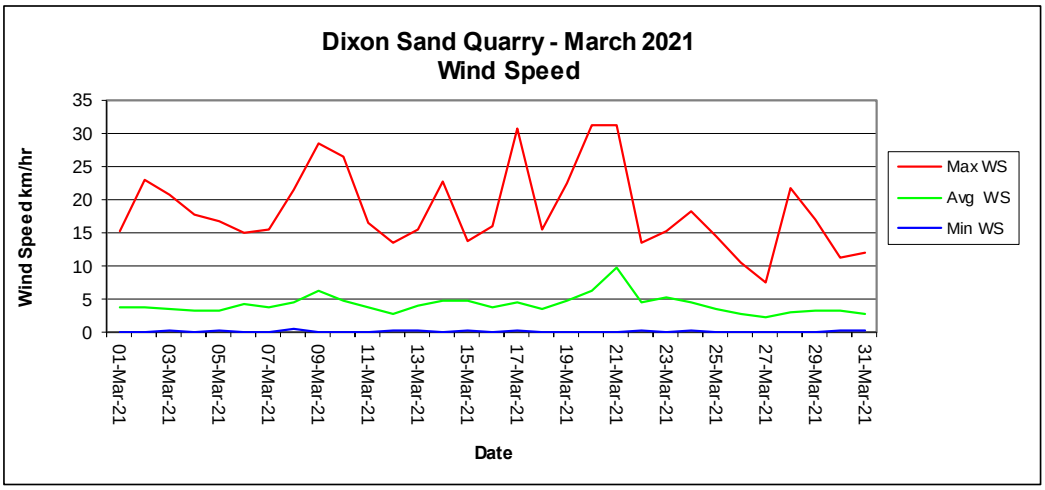
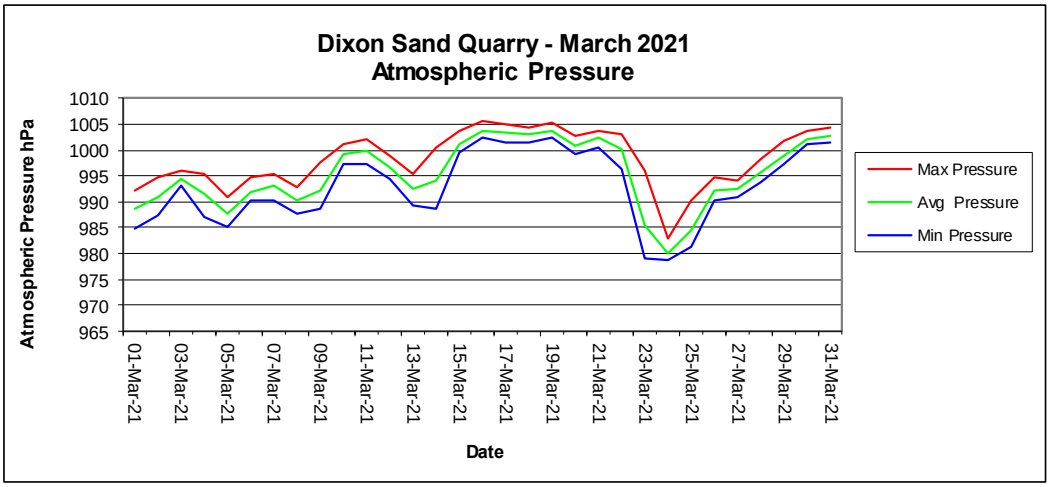
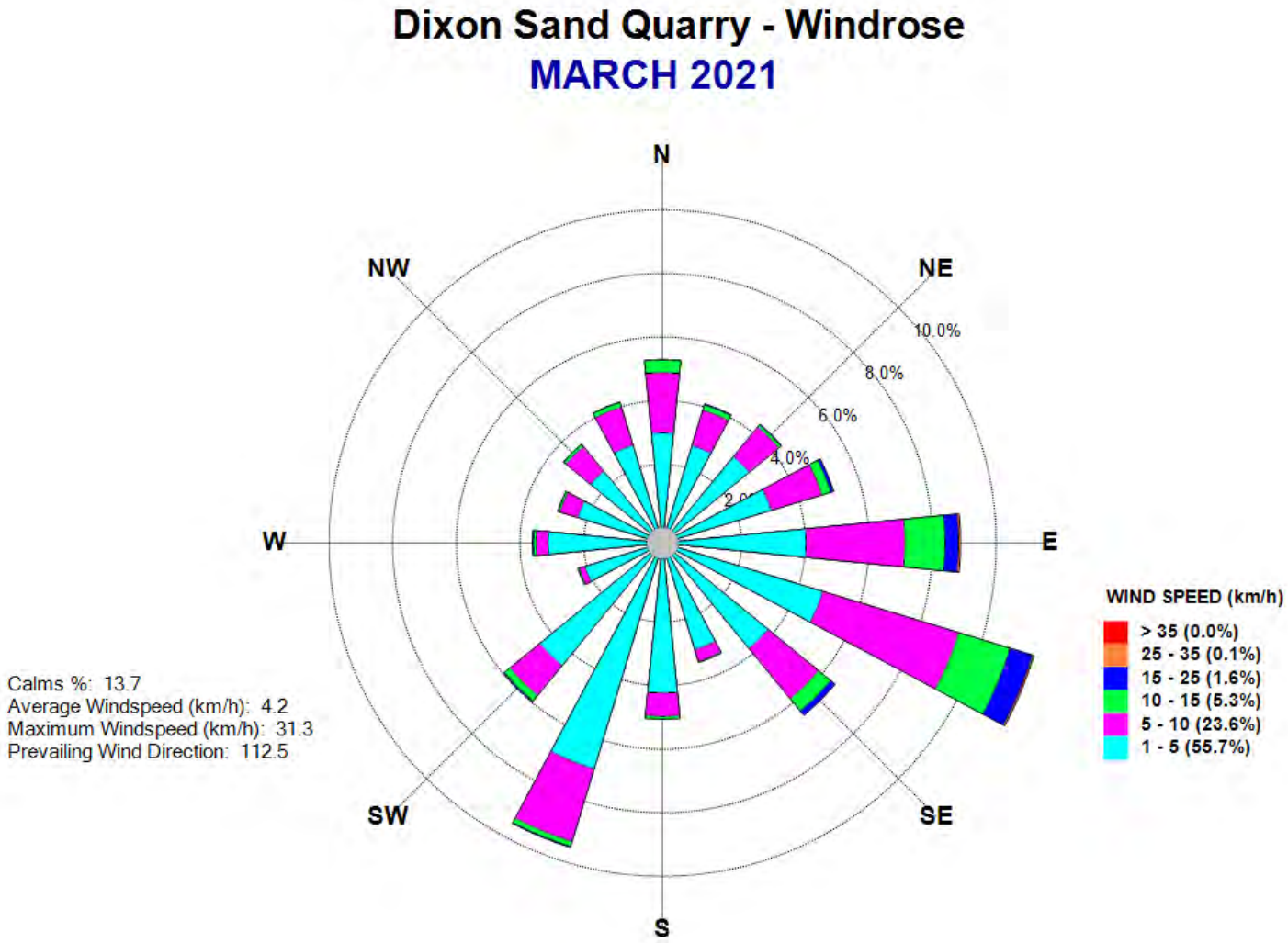


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

Figure 3: *Wind Speed and Atmospheric Pressure Charts*


Dixon Sand Quarry - March 2021
Wind Speed
Wind Speed km/hr
35
30
25
20
15
10
5
0
01-Mar-21
03-Mar-21
05-Mar-21
07-Mar-21
09-Mar-21
11-Mar-21
13-Mar-21
15-Mar-21
17-Mar-21
19-Mar-21
21-Mar-21
23-Mar-21
25-Mar-21
27-Mar-21
29-Mar-21
31-Mar-21
Date
Max WS
Avg WS
Min WS


Dixon Sand Quarry - March 2021
Atmospheric Pressure
Atmospheric Pressure hPa
1010
1005
1000
995
990
985
980
975
970
965
01-Mar-21
03-Mar-21
05-Mar-21
07-Mar-21
09-Mar-21
11-Mar-21
13-Mar-21
15-Mar-21
17-Mar-21
19-Mar-21
21-Mar-21
23-Mar-21
25-Mar-21
27-Mar-21
29-Mar-21
31-Mar-21
Date
Max Pressure
Avg Pressure
Min Pressure


Dixon Sand Quarry - Windrose
MARCH 2021
N
NE
E
SE
S
SW
W
NW
10.0%
8.0%
6.0%
4.0%
Calms %: 13.7
Average Windspeed (km/h): 4.2
Maximum Windspeed (km/h): 31.3
Prevailing Wind Direction: 112.5
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.1%)
15 - 25 (1.6%)
10 - 15 (5.3%)
5 - 10 (23.6%)
1 - 5 (55.7%)

Appendix 1

Calibration Documents (when required)

CARBON BASED ENVIRONMENTAL

Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB

teledata

TEOM Client/Site: Dixon Sudi / TEOM **Date:** 8-3-21

1. TEOM Data Screen **SERIAL No:** 25570 **Firmware:** N/A.

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	Fully op OK	Green - Normal	✓	
Date/time	TEOM: 11:38 Actual: 11:38	Current Date/time correct within 5 minutes		✓ reset time
PM-10 24hr av	21.8	Positive values	✓	
Filter loading PM10	41%	<80 %	✓	
Frequency PM-10	251.11584	200-300 Hz	✓	
Noise PM-10	0.077	<0.100ug	✓	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

Comments: reset time OK ✓

2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	~	<0.50 atm	~	
Warnings	NIL	No Warnings	✓	
If any warnings list:				

Comments:

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DANIEL **Signed** [signature]

3. Instrument Conditions Ambient Conditions and Temperatures

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	30.4	-10 to 50 C	✓	
Ambient Dew Point	–	-10 to 50 C	N/A	N/A.
Ambient Pressure	0.968	0.9-1.1 atm	✓	
Ambient Relative Humidity	–	10-100 %RH	N/A	N/A.
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

Fadj Main = 1.050

Fadj Byp = 1.020 ✓ Left as it.
Any

4. Instrument Conditions – Flows

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.68	12.95 – 14.39 lpm	✓	
Total Flow rate	16.68	15.67 – 17.67 lpm	✓	

Comments:

Results: (Tick box)

☑ **There were NO equipment faults found. No action required – (file report)**

☐ **There were faults found (Fails) – Were these fixed on site: YES/NO (circle)**
Any Fails that cannot be repaired on site must be reported to CBased:
Office: 65713334 or email cbased@bigpond.com
Date faults notified to CBased: _____

Comments/Action Required:

Calibration/Maintenance

1. 1405A: Were Filters replaced YES/NO
2. PM10 Inlet head cleaned YES/NO
3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	31% *	255.10316	255.10317	255.10314	255.10317

✓OK

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)
Pass/Fail – if Fail – install new filter and redo stability test.

* zero filter on

4. Instrument clock verified (Refer Section 1) YES/NO.
If Time changed – clock reset OK YES/NO or NA (not changed)
Comments:

5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary. YES/NO.
Comments if changed:

6. TEOM Cleaned and Air Conditioner checked YES/NO. Air Conditioner settings or operational status: 5 low cool

Tetracal Flow/Temp/Pressure Calibrator Serial No: 17257 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

Quarterly or Six Monthly Calibration

1. Flow Verification – Conducted YES/NO

PM10 Flow verified Flow l/min 2.97 Error % 1.0 (allowed error <6%) PASS/FAIL

Bypass Flow verified Flow l/min 13.72 Error % 0.4 (allowed error <6%) PASS/FAIL
If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:**

2. Leak Check – Conducted YES/NO

PM10 actual 0.13 < Limit 0.15

Bypass actual 0.41 < Limit 0.60

Leak check PASS/FAIL – If fail then find leak and retest.
Comments: Slight leak in Mass transducer. If gets more will need to send for repairs. M

Annual Calibration/Maintenance

1. Temperature and Pressure Calibration – Conducted YES/NO
Reference Temperature: _____C TEOM Temperature_____C
if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: _____atm TEOM Pressure_____atm
if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO

Note: Tetracal measures Atmospheric Pressure in mm Hg or mb or hPa
For mb or hPa divide tetracal result by 1013.25 to change units to atm.
For mmHg divide tetracal result by 760 to change units to atm.

2. Flow Calibration – Conducted YES/NO
PM10
Set point 2.4 Actual:_____
Set point 3.6 Actual:_____
Set point 3.0 Actual:_____ After calibration Final:_____l/min

BYPASS
Set point 10.9 Actual:_____
Set point 16.4 Actual:_____
Set point 13.67 Actual:_____ After calibration Final:_____l/min

3. Mass calibration (K0) Verification – Conducted YES/NO
Actual measured KO = _____ TEOM stated K0_____ Error %:_____
Allowed Error +/- 2.5%. PASS/FAIL
If Error +/- 2.5% repeat. If confirmed consult manufacturer.
Second Error % =_____ PASS/FAIL. Comments:
If second test fails consult manufacturer.

4. Annual Noise check - Conducted YES/NO
Zero filter applied to TEOM and TEOM operated for at least 12 hours:
Start date/time: 8/3/21 17:00 Finish date/time: 9/3/21 08:00
Standard deviation of all recorded data (min 30 min averages) = 2.2 ug/m^3 ✓ PASS
Noise was less than 5ug/m^3 YES/NO

Total AV 4.8 µg/m3
~~bit high but~~ OK

5. Maintenance
Air Inlet system cleaned YES/NO
Pump Reconditioned YES/NO
Check Waterproofing YES/NO
Comments:

CBased Environmental Pty Limited

ABN 62 611 924 264

Weather Station Physical Screening Field Check

Client DIXON SANDS **Site Name:** DIXON SANDS

Date: 8-3-21 **Time:** 12:00

	Yes (Pass)	No (Fail)	Comments
Grass / Vegetation Impacts			
Compound Grass height <10cm	✓		recently mowed
No objects within impact area (10 x height of object)		✓	trees/house near ~~Mast~~.
Ground Anchor / Guy Wires / Mast Condition			
Bottom guy wires tight (correct tension = 35-50mm deflection, with only moderate hand force at 1.5 metres up the guy wire)	NA		Pole (fixed)
Top Guy wires tensioned (correct tension = 60-75mm deflection, with only moderate hand force at 1.5 metres up the guy wire)	NA		Pole (fixed)
Mast Vertical and in good condition	✓		
Ground anchors/star pickets tight in ground	NA		Pole fixed
Guy Wires insignificant corrosion	NA		" "
Ground anchors/D shackles/ winders insignificant corrosion	NA		" "
Bolts/hinge points in mast are secure	NA		" "
Cables / Connectors / Logger Cabinet / Solar Panel			
Cables attached to mast/guy wires via ties are secure		✓	mount raiser up pole + can't fix cable
Insignificant corrosion to plugs/connectors	✓		
No water ingress in logger/battery cabinet	✓		Equipment in TEOM enclosure
Wiring/plugs in cabinet OK, Logger OK	✓		
Battery terminals and condition OK	NA		240V System
Battery volts (charging>13V, not charging >12V)	NA		" "
Solar panel undamaged and clean	NA		NO SOLAR
Sensor shields clean	✓		
Sensor Check			
Wind direction alighed ~~True North~~/Magnetic North (strike out N/A)			Compass Bearing: 350 degrees
Rain gauge cleaned, working OK (1 tip check)	✓		checked 100mL OK. 3:00 AM
Rain gauge level OK	✓		
Anemometer/wind vane moving freely (analogue sensors)	NA		Gill Ultrasonic sensor
Other sensors visually checked and OK	✓		
Last months data checked and OK / Logging data OK	✓		

Checked By: Name COLIN DAVEY **Signed**

CBased Environmental Pty Limited
Unit 3, 2 Enterprise Crescent
SINGLETON NSW 2330
P: (02) 6571 3334

CBased Environmental Pty Limited
ABN 62 611 924 264

Weather Station Field Check

Site: Dixon Sands

Date/Time: 8/03/2021 12:30 -13:30

Measured Against Certified Sensors

Parameter	Units	Measured	Reference	Difference	Pass/Fail	Reference Description
Temperature 10m	°C	27.3	27.5	-0.2	Pass	Ref Thermometer
Humidity	%RH	55	53	2.0	Pass	Ref RH sensor
Rainfall	mm	3.0	3.2	-0.2	Pass	Glass Pipette
Wind Speed	km/hr	5.6	6.0	-0.4	Pass	Ref Anemometer
Wind Direction	Degrees	309	311	-2.0	Pass	Sighting compass

Reference Instruments Specifications: *Calibration expires: 18/12/2021

Sensor	Serial Number	Specifications	Accuracy
*Temperature	200115N01	-40 to 65°C	+/- 0.3°C
*Barometer	BF201110036	20 to 30" Hg	+/- 1.1hPa
*Humidity	200115N01	10 to 90%RH	+/- 2%RH
*Anemometer	200115N03	0 to 64km/hr	+/- 0.9m/s
**Rainfall	Standard number of tips	3.2mm	+/- 0.2mm
Compass	Sighting Compass	0 to 360 degrees	+/- 5 Deg

** 100mL Glass pipette used.

Reference sensors were certified by Davis Instruments USA using a reference traceable to National Institute of Standards and Technology (NIST) and were "in calibration" when used.

Comments:

The weatherstation was in conformance with the reference instruments at the monitored levels. Wind direction is referenced to true north. The calibration check of the raingauge involved adding water to the raingauge. The indicated rain between 12:30 and 1:30pm should be deleted from site records on the 8/3/2021.

NA=Not Available

The meteorological station meets the requirements of the Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

The weather station has Passed the field check. Next annual field check due: Feb-22

Checked by: Colin Davies 9/03/2021

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

April 2021
Amendment 1



Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for April 2021 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3 with the exception of 1 occurrence;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3 with the exception of 1 occurrence;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from 1 July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for April 2021.

Approximately 100% of TEOM data was recovered for April 2021.

2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3 with the exception of one occurrence (25/04/2021) highlighted yellow in **Table 2**. Average windspeed on 25 April 2021 was 2.3 km/h from the west-north-west with a maximum windspeed of 11.1 km/h from the south-south-west.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration was conducted in March 2021 with the next calibration scheduled for June 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for April 2021 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/04/2021	12.5	13.9	31.3	34.8
2/04/2021	8.9	13.9	22.3	34.7
3/04/2021	8.4	13.9	21.0	34.7
4/04/2021	8.9	13.9	22.3	34.6
5/04/2021	17.1	13.9	42.8	34.7
6/04/2021	17.3	13.9	43.3	34.7
7/04/2021	7.6	13.9	19.0	34.6
8/04/2021	7.1	13.8	17.8	34.6
9/04/2021	13.9	13.8	34.8	34.6
10/04/2021	12.4	13.8	31.0	34.6
11/04/2021	10.7	13.8	26.8	34.5
12/04/2021	17.2	13.8	43.0	34.6
13/04/2021	17.2	13.8	43.0	34.6
14/04/2021	18.1	13.9	45.3	34.6
15/04/2021	34.6	13.9	86.5	34.8
16/04/2021	28.4	14.0	71.0	34.9
17/04/2021	14.2	14.0	35.5	34.9
18/04/2021	8.7	14.0	21.8	34.9
19/04/2021	15.9	14.0	39.8	34.9
20/04/2021	22.3	14.0	55.8	35.0
21/04/2021	19.8	14.0	49.5	35.0
22/04/2021	15.2	14.0	38.0	35.0
23/04/2021	18.6	14.0	46.5	35.1
24/04/2021	22.4	14.1	56.0	35.2
25/04/2021	**57.0**	14.2	142.5	35.5
26/04/2021	16.3	14.2	40.8	35.5
27/04/2021	23.8	14.2	59.5	35.6
28/04/2021	23.7	14.3	59.3	35.7
29/04/2021	17.6	14.3	44.0	35.7
30/04/2021	22.6	14.3	56.5	35.8

*Calculated from PM10

**Calculated from PM10 Annual Average

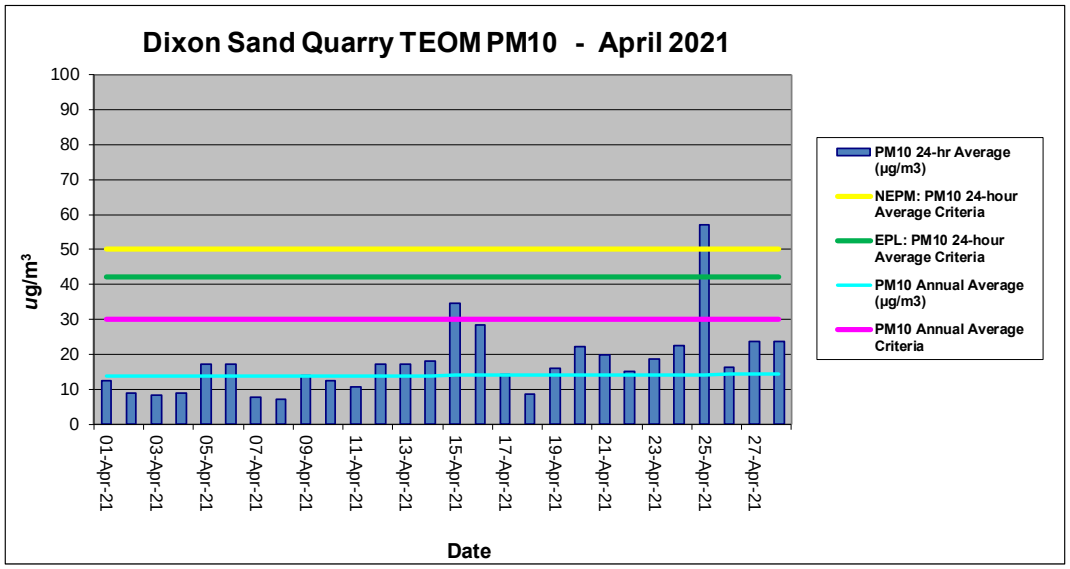


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in March 2021 and is next due in February 2022. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for April 2021

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/04/2021	13.2	17.7	23.3	2.0	0.0	2.8	12.9	55.2	85.3	100.0	1002.2	1003.7	1005.2
2/04/2021	14.7	18.9	24.4	0.0	0.0	2.8	11.6	49.7	84.9	100.0	1003.9	1005.3	1006.8
3/04/2021	14.9	19.1	24.7	0.2	0.1	2.9	12.2	55.3	89.2	100.0	1000.8	1003.3	1006.1
4/04/2021	15.5	20.9	27.0	0.0	0.2	3.1	11.1	41.4	76.8	100.0	995.7	998.2	1001.5
5/04/2021	15.3	20.5	26.7	0.0	0.0	3.1	14.5	51.8	84.8	100.0	995.8	998.2	1000.9
6/04/2021	17.7	19.4	23.4	0.6	0.0	2.5	16.2	82.8	98.7	100.0	998.9	1000.1	1001.9
7/04/2021	17.0	18.8	22.0	7.8	0.1	2.5	9.8	87.2	99.6	100.0	994.6	997.1	999.4
8/04/2021	17.3	19.2	23.6	0.4	0.0	2.3	13.5	65.8	94.3	100.0	988.5	991.7	994.6
9/04/2021	16.3	20.5	26.7	0.2	0.2	4.0	13.0	35.6	79.2	99.5	982.4	985.3	988.5
10/04/2021	12.7	17.3	22.4	0.6	0.0	3.0	16.9	32.3	68.4	100.0	983.9	986.1	988.4
11/04/2021	8.9	13.6	17.4	0.0	0.3	4.2	23.1	27.3	46.0	72.7	987.0	990.3	995.2
12/04/2021	7.5	12.7	18.5	0.0	0.0	2.5	14.9	31.1	51.8	68.9	994.6	997.7	1000.7
13/04/2021	8.1	15.2	20.8	0.0	0.0	3.7	16.6	35.7	59.4	85.9	996.8	999.2	1002.2
14/04/2021	13.5	20.0	26.5	0.0	0.2	4.9	20.8	18.3	37.2	72.9	991.8	994.1	997.1
15/04/2021	15.0	19.3	25.3	0.0	0.2	2.7	14.6	31.9	41.0	53.8	991.6	993.9	996.1
16/04/2021	13.1	16.4	21.0	0.0	0.0	4.1	18.7	39.2	57.7	75.9	994.8	999.5	1003.2
17/04/2021	10.9	13.7	15.4	0.2	0.0	1.7	8.5	73.3	92.5	99.4	1000.8	1001.9	1003.1
18/04/2021	8.7	14.1	20.8	0.2	0.0	2.5	7.3	35.4	80.3	100.0	997.7	999.8	1001.6
19/04/2021	9.9	16.1	23.0	0.0	0.1	2.5	10.0	27.3	67.6	99.6	994.0	996.4	998.7
20/04/2021	12.0	16.8	21.0	0.0	0.2	3.7	13.0	36.4	46.8	59.1	989.4	992.7	995.8
21/04/2021	11.2	15.2	19.2	0.0	0.0	3.8	19.9	30.6	50.1	73.9	988.7	992.0	995.0
22/04/2021	8.5	12.9	19.2	0.0	0.0	2.7	16.0	28.4	54.0	86.0	989.7	992.7	995.3
23/04/2021	9.4	14.3	21.1	0.0	0.2	2.9	11.0	36.0	53.3	77.1	994.7	996.6	999.9
24/04/2021	9.9	15.1	21.0	0.0	0.0	2.7	13.9	38.4	64.0	99.2	998.6	1000.2	1001.9
25/04/2021	8.9	14.1	20.5	0.0	0.0	2.3	11.1	39.1	80.7	100.0	1000.6	1002.2	1003.8
26/04/2021	11.5	15.5	21.7	0.0	0.0	2.2	9.9	38.8	81.7	100.0	1002.0	1003.6	1005.0
27/04/2021	11.1	15.5	21.7	0.0	0.0	2.6	13.2	47.1	84.5	100.0	1003.5	1005.2	1007.1
28/04/2021	12.6	15.9	20.3	0.0	0.0	2.4	8.0	54.7	86.0	100.0	1002.2	1004.2	1005.9
29/04/2021	11.9	16.1	21.8	0.0	0.1	3.1	11.9	44.3	83.5	99.6	1001.9	1003.4	1005.3
30/04/2021	11.1	15.7	22.6	0.0	0.0	2.7	14.2	54.8	90.4	100.0	1005.1	1006.8	1008.6
Monthly	7.5	16.7	27.0	12.2	0.0	3.0	23.1	18.3	72.3	100.0	982.4	998.1	1008.6

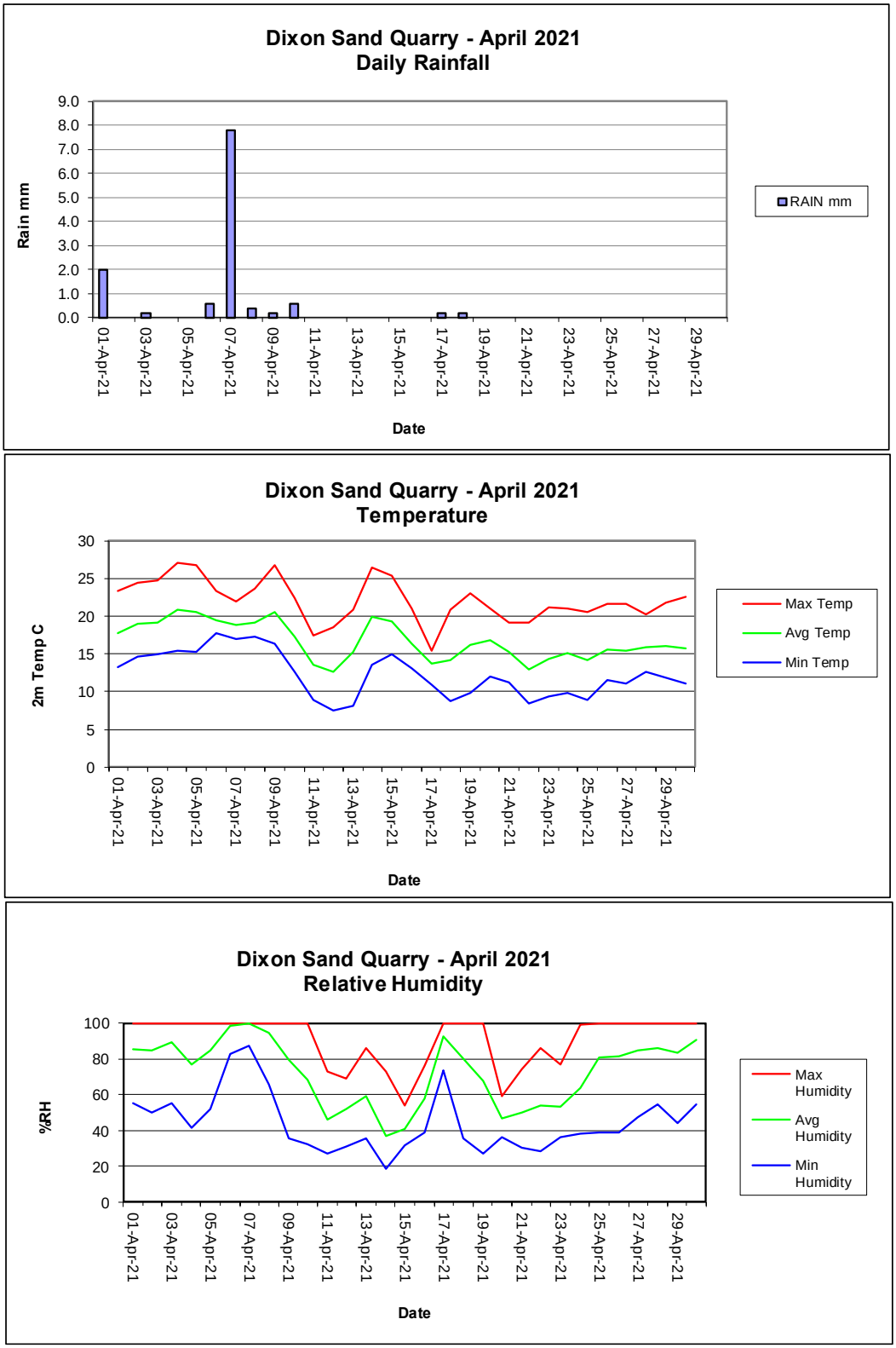


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

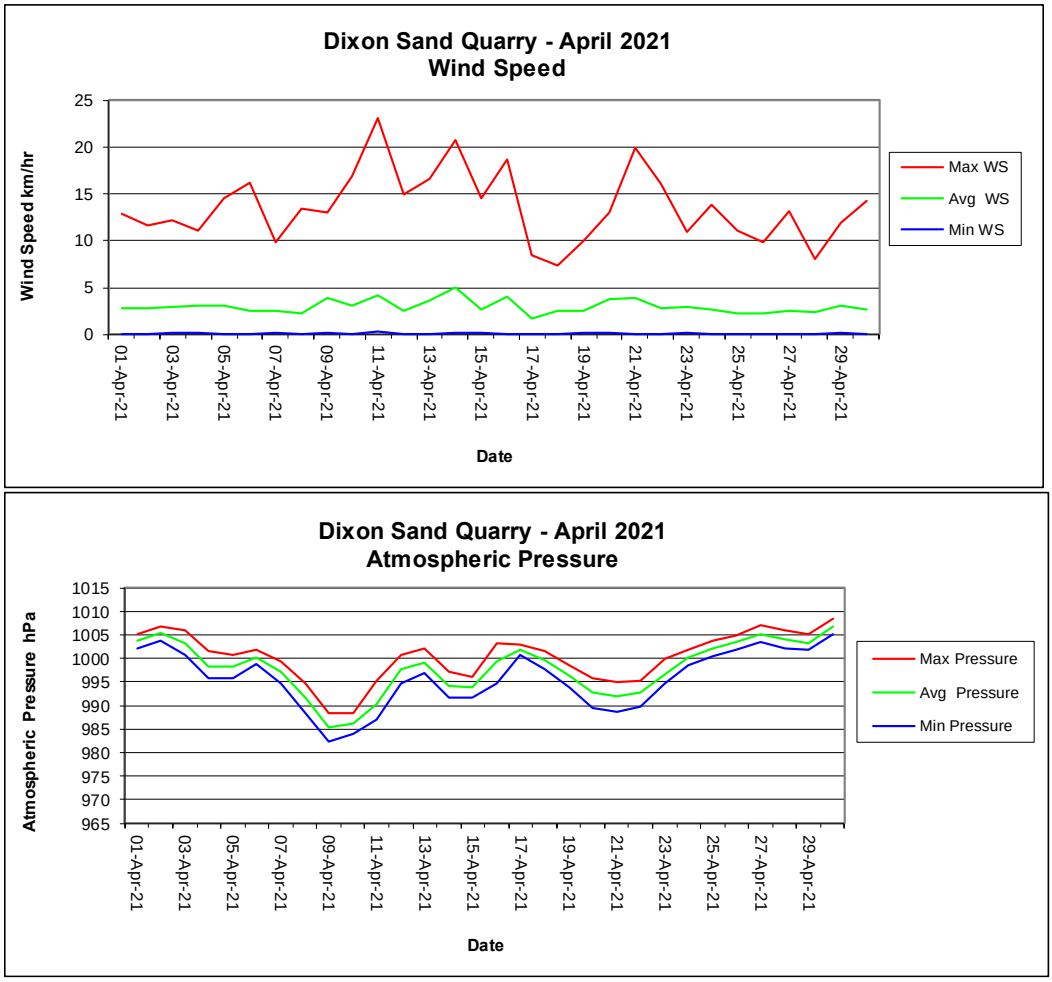
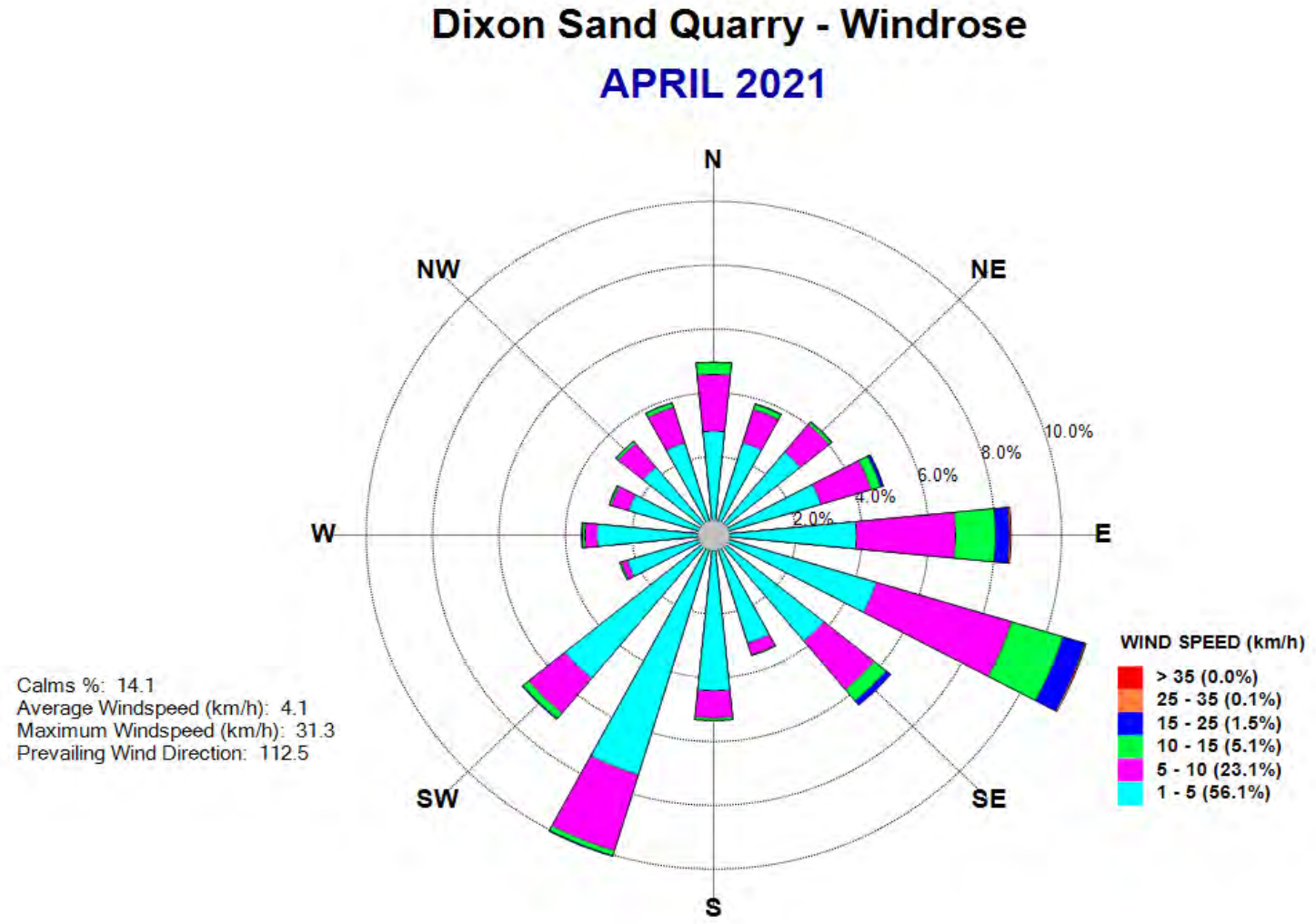


Figure 3: *Wind Speed and Atmospheric Pressure Charts*


Dixon Sand Quarry - Windrose
APRIL 2021
N
NE
E
SE
S
SW
W
NW
2.0%
4.0%
6.0%
8.0%
10.0%
Calms %: 14.1
Average Windspeed (km/h): 4.1
Maximum Windspeed (km/h): 31.3
Prevailing Wind Direction: 112.5
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.1%)
15 - 25 (1.5%)
10 - 15 (5.1%)
5 - 10 (23.1%)
1 - 5 (56.1%)

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

May 2021

Amendment 1



Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM_{10}) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM_{10} monitor; and
- One continuous Meteorological Station.

This monthly report for May 2021 was prepared by CBased Environmental and includes the following:

- TEOM (PM_{10}) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m^3;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m^3;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m^3; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m^3.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM_{10} is calculated from 1 July 2020 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of meteorological data was recovered for May 2021.

Approximately 100% of TEOM data was recovered for May 2021.

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The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 (2001) "*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*"; and
- 3580.1.1 (2007) "*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*".

TEOM PM_{10} results are 24-hour averages at midnight and are reported as $\mu g/m^3$ corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

Table 1: Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM_{10}	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

3.0 Results

3.1 TEOM PM_{10}

24-hour average TEOM PM_{10} results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM_{10} results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m^3 and the Dixon Sand Quarry EPL limit of 42ug/m^3.

At present, the current TEOM PM_{10} annual average is below the Dixon Sand Quarry annual average PM_{10} criteria of 30ug/m^3. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m^3. The TSP is calculated by multiplying the PM_{10} by 2.5. Note: the annual average is calculated from 1 July 2020 and therefore an annual amount of data has not yet been collected.

The quarterly calibration was conducted in March 2021 with the next calibration scheduled for June 2021. The calibration certificate is provided in **Appendix 1** (when required).

Table 2: Average Daily 24-hr TEOM PM_{10} and TSP Results for May 2021 from AQMS and Annual Average PM_{10} calculated from the 1 July 2020.

Date	PM_{10} 24-hr Average ($\mu g/m^3$)	PM_{10} Annual Average ($\mu g/m^3$)	24-hr Average TSP* ($\mu g/m^3$)	Annual Average TSP** ($\mu g/m^3$)
1/05/2021	16.7	14.3	41.8	35.8
2/05/2021	6.7	14.3	16.8	35.7
3/05/2021	10.1	14.3	25.3	35.7
4/05/2021	33.6	14.3	84.0	35.9
5/05/2021	16.4	14.4	41.0	35.9
6/05/2021	7.2	14.3	18.0	35.8
7/05/2021	7.7	14.3	19.3	35.8
8/05/2021	7.6	14.3	19.0	35.7
9/05/2021	9.7	14.3	24.3	35.7
10/05/2021	10.1	14.3	25.3	35.7
11/05/2021	9.6	14.2	24.0	35.6
12/05/2021	14.2	14.2	35.4	35.6
13/05/2021	10.3	14.2	25.8	35.6
14/05/2021	8.8	14.2	22.0	35.5
15/05/2021	7.1	14.2	17.8	35.5
16/05/2021	6.4	14.2	16.0	35.4
17/05/2021	15.3	14.2	38.3	35.4
18/05/2021	17.7	14.2	44.3	35.5
19/05/2021	12.0	14.2	30.0	35.4
20/05/2021	15.9	14.2	39.8	35.5
21/05/2021	18.4	14.2	46.0	35.5
22/05/2021	13.2	14.2	33.0	35.5
23/05/2021	12.3	14.2	30.8	35.5
24/05/2021	9.5	14.2	23.8	35.4
25/05/2021	9.6	14.2	24.0	35.4
26/05/2021	9.4	14.1	23.5	35.4
27/05/2021	11.0	14.1	27.5	35.3
28/05/2021	11.1	14.1	27.8	35.3
29/05/2021	11.2	14.1	28.0	35.3
30/05/2021	9.4	14.1	23.5	35.3
31/05/2021	21.8	14.1	54.5	35.3

*Calculated from PM10

**Calculated from PM10 Annual Average

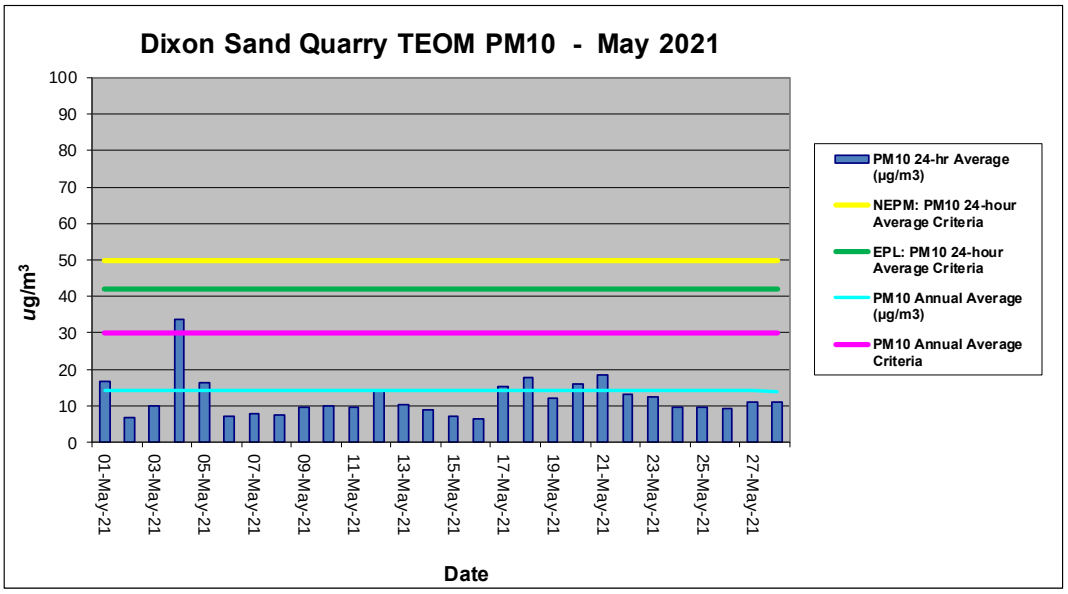


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site http://console.teledata.com.au/index.html.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

An annual physical screening and system check of the meteorological station was conducted in March 2021 and is next due in February 2022. The screening and system check certificates are provided in **Appendix 1** (when required).

Table 3: Meteorological Data Summary for May 2021

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/05/2021	13.0	16.6	21.6	0.2	0.0	2.8	11.8	68.5	95.4	100.0	1006.5	1008.1	1009.7
2/05/2021	11.8	16.6	22.5	0.0	0.1	2.6	11.0	58.7	91.8	100.0	1003.4	1005.6	1007.9
3/05/2021	12.0	17.3	23.7	0.2	0.0	2.5	9.3	43.7	78.9	100.0	996.6	999.8	1003.5
4/05/2021	13.0	14.6	18.3	5.6	0.1	2.2	16.7	64.9	93.5	100.0	994.4	995.5	996.6
5/05/2021	12.6	14.3	15.8	4.4	0.0	3.2	11.2	99.4	100.0	100.0	992.2	993.7	995.1
6/05/2021	14.5	17.2	20.4	32.0	0.4	5.5	18.2	99.2	99.8	100.0	989.5	991.3	993.0
7/05/2021	15.8	17.4	20.1	13.4	0.0	4.0	16.7	99.2	100.0	100.0	989.1	990.5	992.0
8/05/2021	14.2	18.4	23.6	0.0	0.1	2.8	9.7	58.1	89.4	100.0	990.8	993.2	996.9
9/05/2021	13.8	16.0	18.1	0.0	0.1	2.4	8.9	59.3	91.4	100.0	996.3	997.5	999.2
10/05/2021	14.2	18.0	23.0	0.2	0.1	3.3	10.7	43.5	70.1	99.2	991.8	994.0	996.4
11/05/2021	12.6	16.1	20.1	0.8	0.1	4.0	14.8	57.4	81.3	100.0	992.3	994.8	998.5
12/05/2021	11.5	15.1	19.8	10.4	0.2	3.0	10.8	72.9	92.4	100.0	996.1	997.9	999.9
13/05/2021	11.7	15.6	22.3	0.2	0.1	2.2	9.8	75.5	99.2	100.0	989.1	992.2	996.0
14/05/2021	10.3	14.1	18.9	0.0	0.2	3.3	27.1	28.6	72.1	100.0	989.7	991.9	995.0
15/05/2021	6.8	11.3	16.1	0.0	0.0	3.2	17.9	55.0	99.1	100.0	990.2	993.5	997.9
16/05/2021	5.1	10.2	17.3	0.0	0.1	2.4	13.0	35.4	88.4	100.0	997.1	998.8	1000.9
17/05/2021	6.8	11.8	17.6	0.0	0.1	2.9	14.0	41.2	63.8	100.0	998.2	1001.8	1006.0
18/05/2021	7.5	12.4	18.3	0.0	0.1	2.6	12.0	100.0	100.0	100.0	1005.2	1006.5	1008.0
19/05/2021	7.7	13.2	19.1	0.0	0.0	2.7	12.4	38.9	76.5	100.0	1004.5	1006.2	1008.2
20/05/2021	9.8	14.3	20.9	0.0	0.1	2.7	8.8	37.2	55.7	77.0	1003.8	1005.4	1007.4
21/05/2021	7.5	11.3	14.1	0.2	0.0	2.0	8.3	59.2	93.6	100.0	1007.1	1008.1	1009.7
22/05/2021	7.7	12.6	18.7	0.0	0.1	2.3	8.3	55.0	87.2	100.0	1003.4	1005.5	1007.5
23/05/2021	8.3	12.9	18.4	0.2	0.0	2.2	10.5	65.7	91.8	100.0	1003.9	1005.8	1008.1
24/05/2021	12.1	14.4	19.3	0.4	0.2	2.8	10.0	68.9	96.1	100.0	1006.7	1007.8	1010.1
25/05/2021	9.8	15.3	20.0	0.2	0.3	3.6	16.1	56.6	84.4	100.0	997.1	1002.6	1006.7
26/05/2021	9.8	15.6	20.7	0.0	0.1	4.9	17.8	31.1	55.2	88.8	994.9	997.1	1000.8
27/05/2021	7.9	11.8	17.1	0.0	0.1	2.5	12.6	36.0	56.3	69.8	1000.1	1001.6	1003.7
28/05/2021	7.3	10.9	15.3	0.0	0.0	4.3	21.2	32.6	53.6	72.4	1000.4	1003.4	1007.0
29/05/2021	6.7	10.4	14.2	0.0	1.3	7.9	20.4	48.8	57.0	64.2	1005.8	1006.7	1008.0
30/05/2021	8.9	11.5	14.6	0.0	0.1	6.0	16.7	57.8	68.3	97.9	1005.2	1005.9	1007.8
31/05/2021	8.2	12.0	18.6	0.0	0.1	2.4	9.2	49.3	78.8	99.2	1001.8	1003.7	1005.4
Monthly	5.1	14.2	23.7	68.4	0.0	3.3	27.1	28.6	82.6	100.0	989.1	1000.2	1010.1

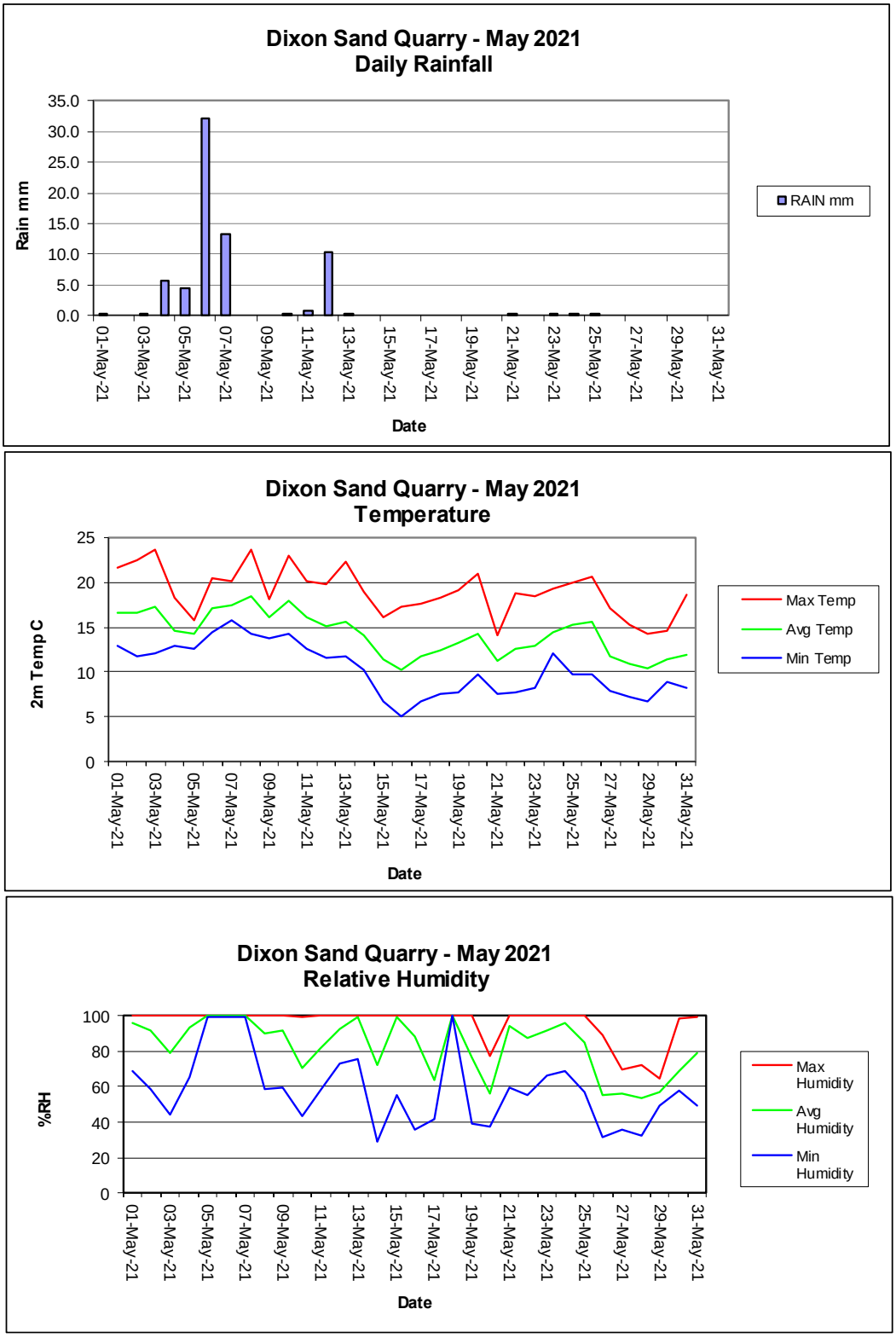


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

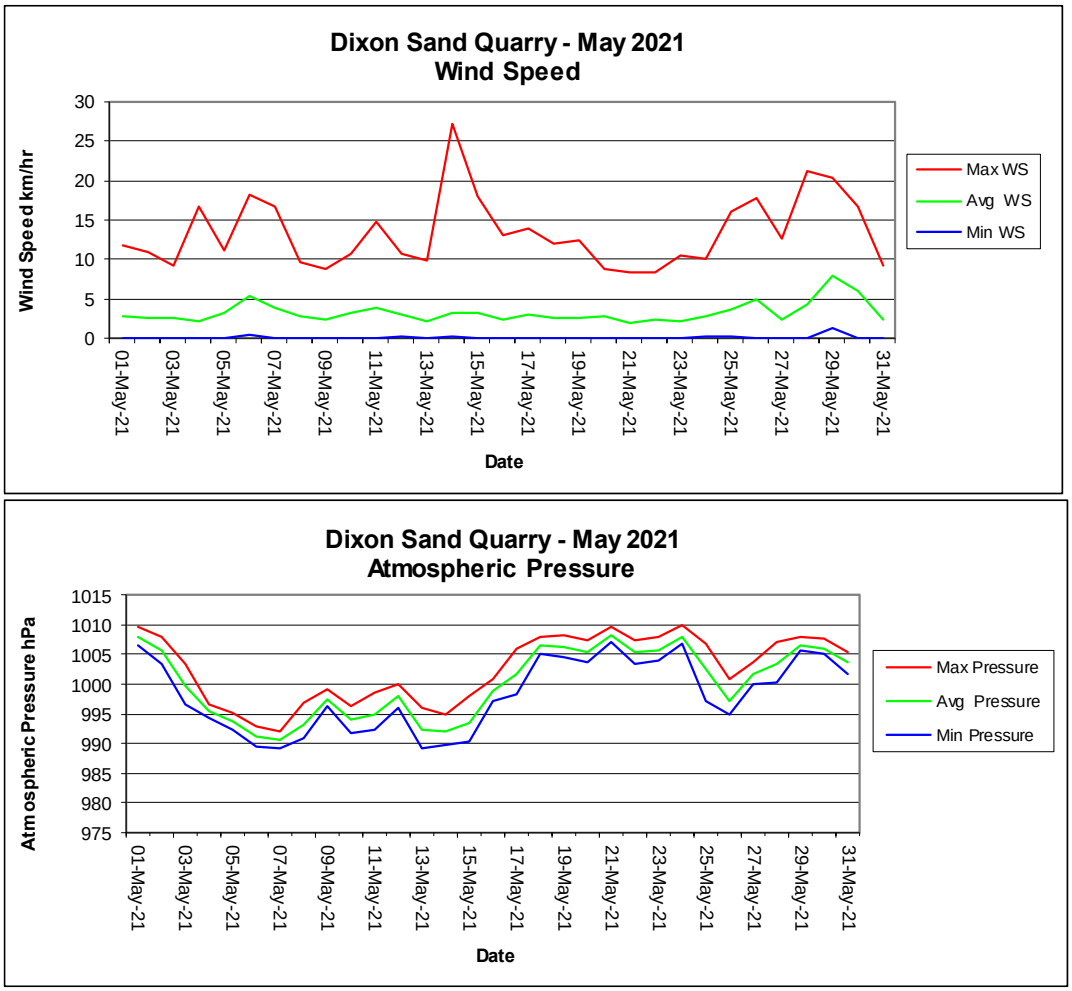
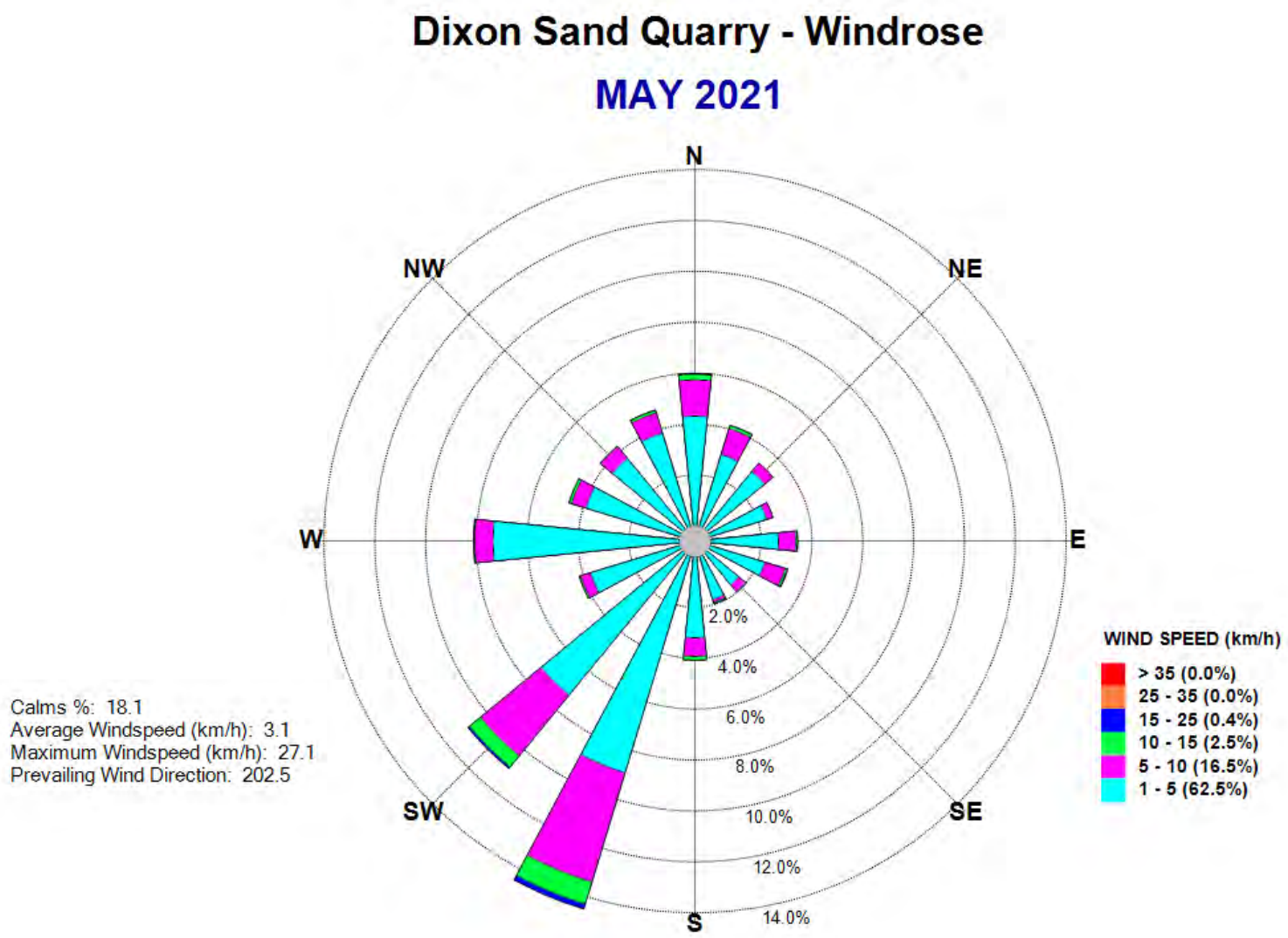


Figure 3: *Wind Speed and Atmospheric Pressure Charts*


Dixon Sand Quarry - Windrose
MAY 2021
N
NE
E
SE
S
SW
W
NW
2.0%
4.0%
6.0%
8.0%
10.0%
12.0%
14.0%
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.0%)
15 - 25 (0.4%)
10 - 15 (2.5%)
5 - 10 (16.5%)
1 - 5 (62.5%)
Calms %: 18.1
Average Windspeed (km/h): 3.1
Maximum Windspeed (km/h): 27.1
Prevailing Wind Direction: 202.5

Appendix 1

Calibration Documents (when required)

CBased Environmental Pty Limited
ABN 62 611 924 264

Dixon Sand Quarry

Environmental Monitoring
Air Quality

Tapered Element Oscillating Microbalance (TEOM) (PM_{10}) and Meteorological Data

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June 2021

Amendment 1

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 4 August 2021

CBased Environmental Pty Ltd
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330
☎ (02) 65713334

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2/06/2021	16.0	14.1	40.0	35.3
3/06/2021	13.1	14.1	32.8	35.3
4/06/2021	12.9	14.1	32.3	35.3
5/06/2021	7.2	14.1	18.0	35.2
6/06/2021	7.5	14.1	18.8	35.2
7/06/2021	8.6	14.1	21.5	35.1
8/06/2021	10.3	14.0	25.8	35.1
9/06/2021	5.3	14.0	13.3	35.0
10/06/2021	5.7	14.0	14.3	35.0
11/06/2021	6.8	14.0	17.0	34.9
12/06/2021	4.4	13.9	11.0	34.9
13/06/2021	5.9	13.9	14.8	34.8
14/06/2021	8.0	13.9	20.0	34.8
15/06/2021	14.8	13.9	37.0	34.8
16/06/2021	12.6	13.9	31.5	34.8
17/06/2021	10.0	13.9	25.0	34.7
18/06/2021	8.7	13.9	21.8	34.7
19/06/2021	6.8	13.9	17.0	34.6
20/06/2021	8.4	13.8	21.0	34.6
21/06/2021	10.1	13.8	25.3	34.6
22/06/2021	14.2	13.8	35.5	34.6
23/06/2021	6.5	13.8	16.3	34.5
24/06/2021	8.8	13.8	22.0	34.5
25/06/2021	6.3	13.8	15.8	34.4
26/06/2021	4.9	13.7	12.3	34.4
27/06/2021	6.4	13.7	16.0	34.3
28/06/2021	12.5	13.7	31.3	34.3
29/06/2021	10.4	13.7	26.0	34.3
30/06/2021	9.7	13.7	24.3	34.3

*Calculated from PM10

**Calculated from PM10 Annual Average

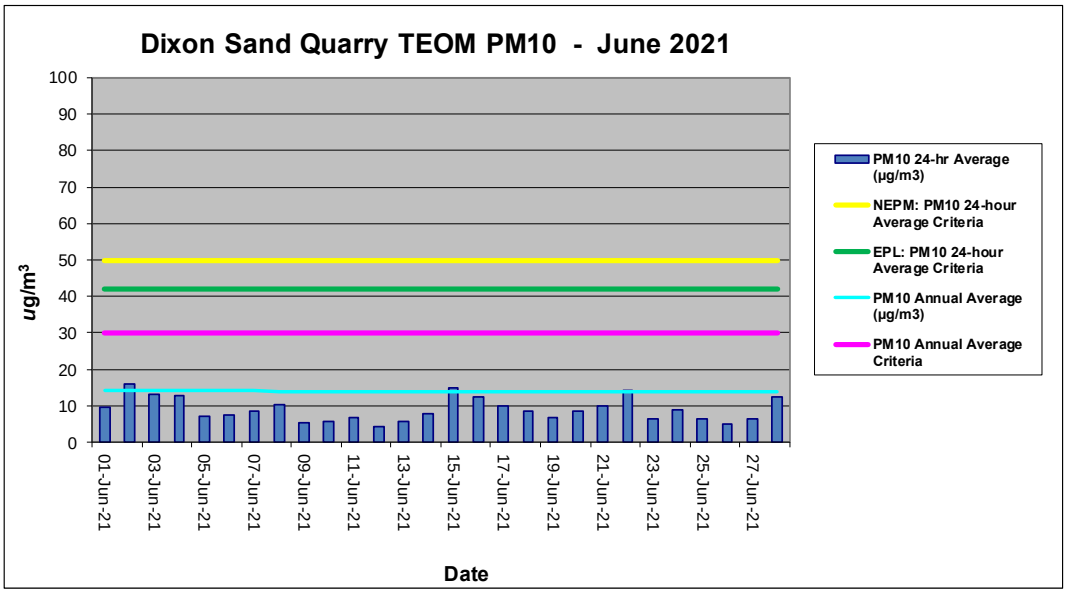


Figure 1: *TEOM PM_{10} 24 hr, Annual Average and Criteria*

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1/06/2021	7.5	12.6	17.4	0.0	0.3	3.6	13.3	53.1	75.5	99.5	999.7	1001.3	1002.8
2/06/2021	9.7	14.4	20.5	0.0	0.1	2.8	9.8	42.7	63.2	88.0	996.8	998.8	1000.8
3/06/2021	10.6	11.9	14.9	6.8	0.1	2.2	8.2	64.4	94.7	100.0	988.0	992.2	996.9
4/06/2021	9.6	13.0	18.7	0.4	0.4	2.9	12.1	47.7	74.5	100.0	987.5	991.2	997.3
5/06/2021	6.8	11.2	15.0	0.0	0.1	3.0	12.2	50.3	69.6	99.4	997.1	999.9	1002.1
6/06/2021	7.0	11.8	17.4	0.0	0.2	2.4	8.7	46.2	57.6	99.4	999.8	1002.2	1004.0
7/06/2021	6.8	12.6	17.8	0.0	0.6	4.8	13.0	44.6	67.9	99.2	996.0	1000.0	1003.1
8/06/2021	10.3	12.7	17.5	10.6	0.0	5.1	19.4	55.8	82.7	100.0	986.6	990.9	995.9
9/06/2021	5.9	9.2	12.3	0.2	0.2	5.6	25.5	53.0	78.0	100.0	981.7	983.8	987.0
10/06/2021	5.4	6.6	8.2	4.8	0.3	3.6	12.6	91.2	98.4	99.7	982.1	984.4	987.1
11/06/2021	5.0	9.2	14.9	0.0	0.5	4.4	18.5	53.4	80.6	100.0	987.0	990.4	994.7
12/06/2021	8.3	11.4	15.8	0.2	0.4	5.3	17.9	44.8	63.8	82.7	993.6	995.0	996.3
13/06/2021	8.3	11.4	17.3	0.0	0.1	3.0	12.2	42.4	60.3	69.2	993.8	995.5	997.0
14/06/2021	6.9	11.4	17.3	0.0	0.1	2.1	8.3	53.8	68.3	86.5	994.2	995.3	996.2
15/06/2021	9.2	12.2	15.7	0.0	0.0	2.0	8.2	69.2	87.9	99.3	995.0	996.2	997.6
16/06/2021	6.8	12.6	18.3	2.4	0.2	4.0	13.0	49.7	80.1	100.0	987.7	993.7	997.0
17/06/2021	7.8	11.4	15.1	1.0	0.2	5.4	21.4	44.2	66.1	100.0	987.4	988.8	990.3
18/06/2021	9.0	12.0	16.3	3.8	0.2	4.5	16.1	45.6	68.5	99.4	984.8	987.0	988.5
19/06/2021	9.7	12.2	14.1	0.0	1.7	10.1	32.5	55.4	65.4	96.8	988.1	993.2	999.1
20/06/2021	9.0	11.0	12.8	1.8	1.7	8.3	23.7	66.2	84.7	100.0	998.7	1001.9	1004.4
21/06/2021	8.9	11.0	14.8	1.2	0.2	4.3	14.4	78.0	92.2	99.6	1003.7	1005.7	1007.8
22/06/2021	8.0	11.2	16.6	0.2	0.2	2.1	7.1	69.5	94.8	100.0	1007.5	1009.0	1011.2
23/06/2021	8.9	12.8	16.2	0.2	0.0	3.8	15.4	67.7	84.8	100.0	998.4	1004.1	1008.8
24/06/2021	13.1	15.7	19.6	0.0	0.1	7.8	25.3	53.8	71.3	88.8	990.8	993.9	998.3
25/06/2021	11.1	13.9	17.3	0.0	0.1	4.2	24.0	45.4	67.9	99.2	992.2	994.7	997.6
26/06/2021	9.1	11.8	16.4	0.2	0.4	4.1	12.6	40.9	67.1	93.2	997.1	998.9	1002.1
27/06/2021	8.0	11.4	16.3	0.0	0.1	3.3	8.4	37.5	58.9	74.5	1001.9	1004.6	1008.6
28/06/2021	5.9	10.1	14.6	0.0	0.3	3.7	10.2	72.8	90.5	99.3	1008.2	1009.9	1011.4
29/06/2021	8.9	10.8	12.9	4.0	0.0	3.7	10.2	95.6	99.0	100.0	1010.5	1011.5	1013.0
30/06/2021	9.7	11.9	15.1	0.8	0.0	2.0	5.5	97.9	99.9	100.0	1006.1	1008.5	1011.2
Monthly	**5.0**	**11.7**	**20.5**	**38.6**	**0.0**	**4.1**	**32.5**	**37.5**	**77.1**	**100.0**	**981.7**	**997.4**	**1013.0**

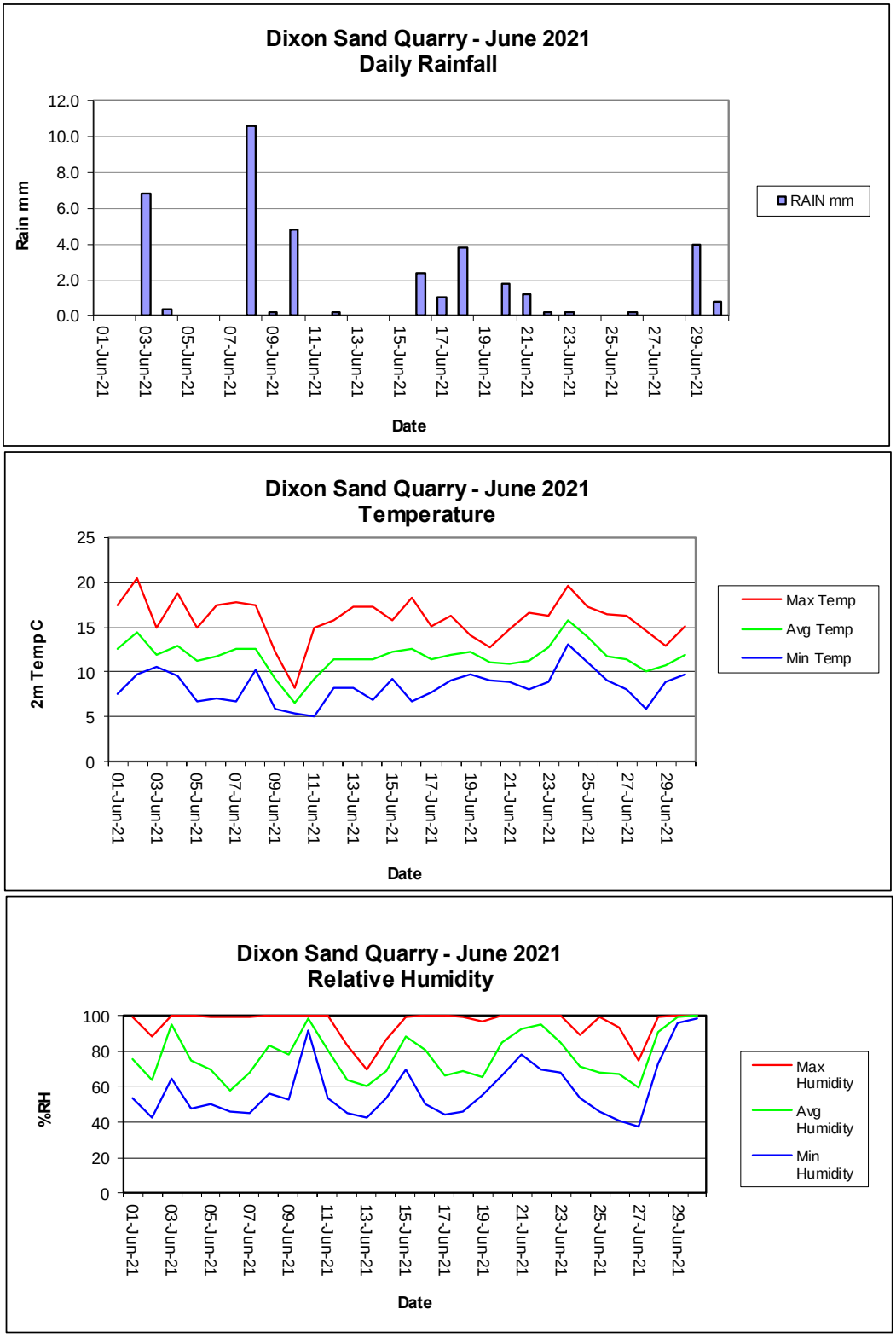


Figure 2: *Daily Rainfall, Temperature and Relative Humidity Charts*

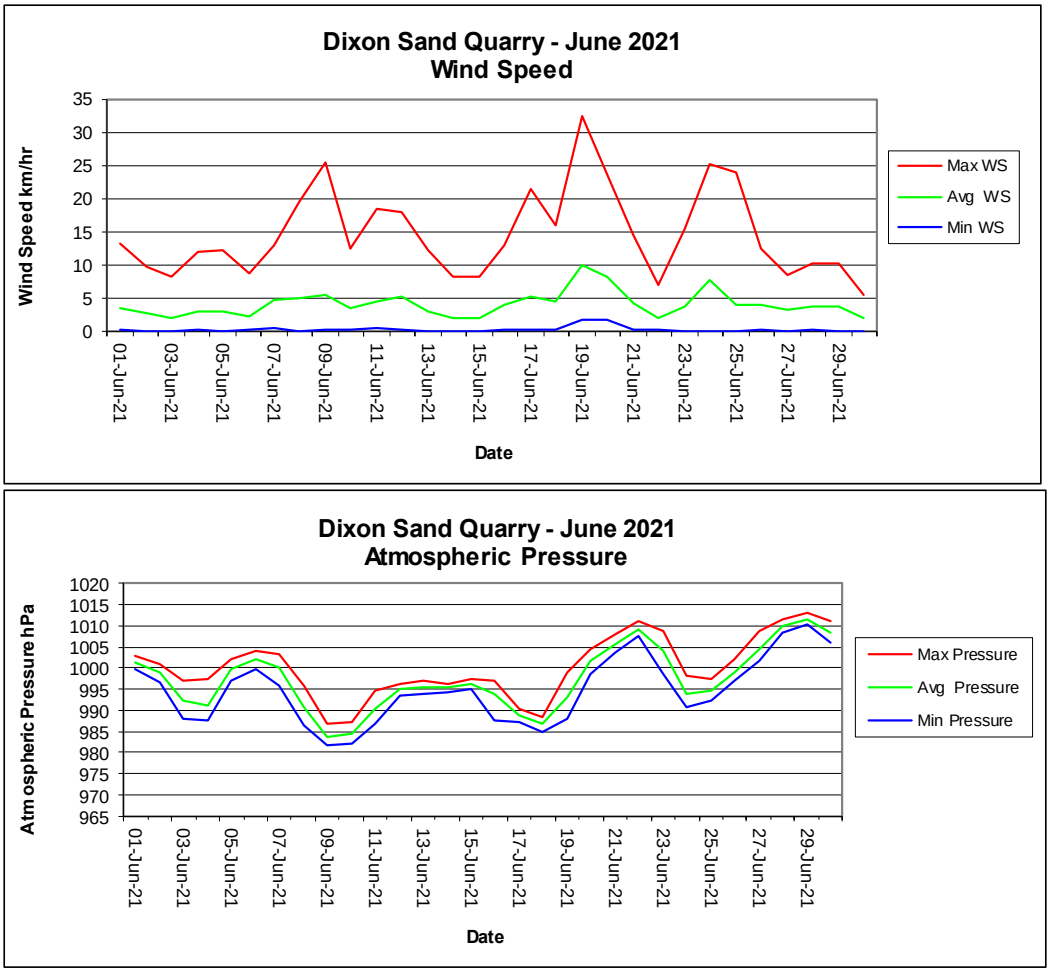
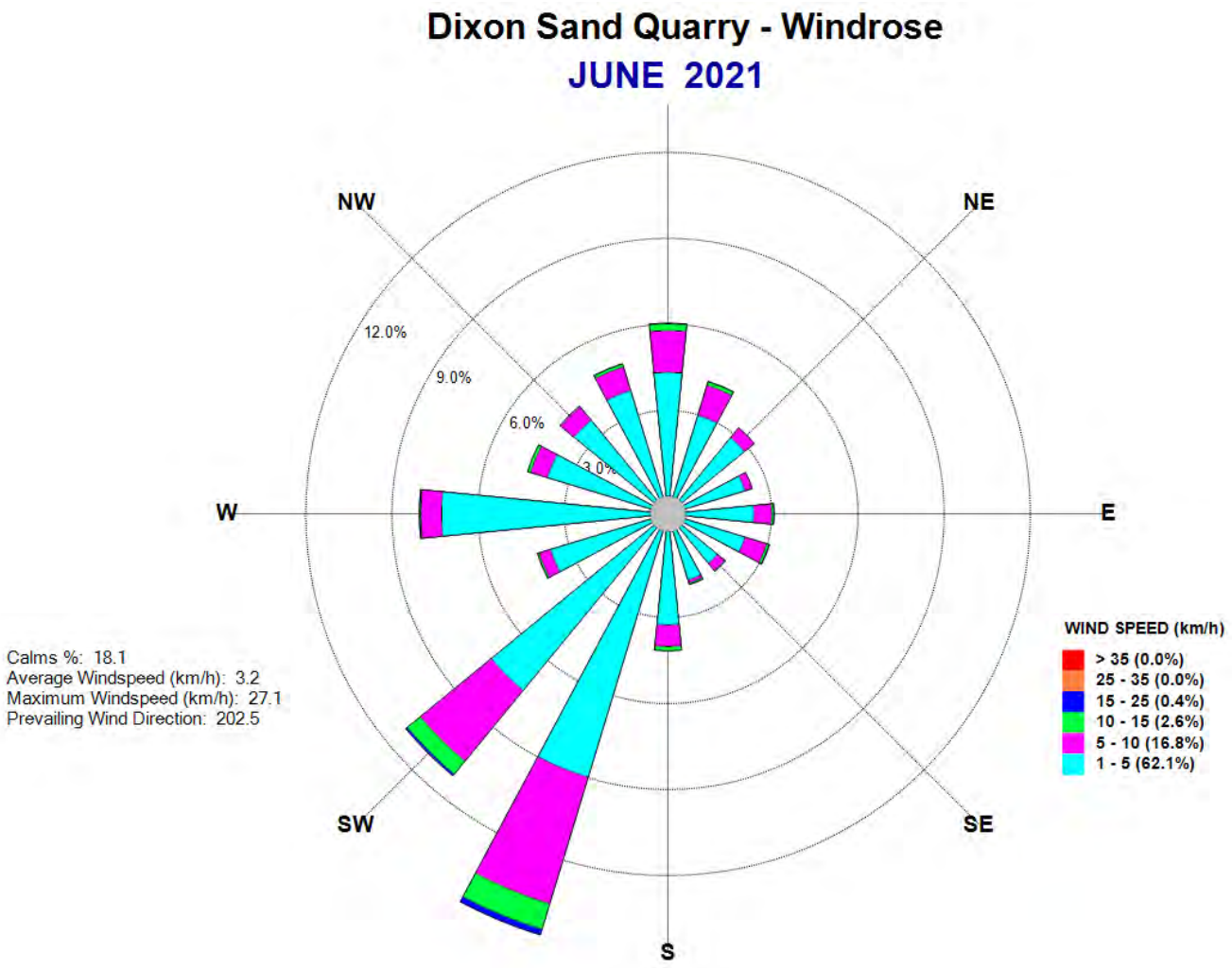


Figure 3: *Wind Speed and Atmospheric Pressure Charts*


Dixon Sand Quarry - Windrose
JUNE 2021
NW
NE
W
E
SW
SE
S
12.0%
9.0%
6.0%
3.0%
Calms %: 18.1
Average Windspeed (km/h): 3.2
Maximum Windspeed (km/h): 27.1
Prevailing Wind Direction: 202.5
WIND SPEED (km/h)
> 35 (0.0%)
25 - 35 (0.0%)
15 - 25 (0.4%)
10 - 15 (2.6%)
5 - 10 (16.8%)
1 - 5 (62.1%)

Appendix 1

Calibration Documents (when required)

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environment and process solutions

LSA

ABN 36 099 046 376

www.learsiegler.com.au

Unit 5A / 2 Resolution Drive

Caringbah 2229 NSW Australia

Telephone : (02) 9531 5444

Fax : (02) 9531 5411

P.O. Box 2735 Taren Point NSW 2229

Booking No: SS34275

Order No:

Client: Cbased

Date: 20-Jul-21

Tel:

Fax:

Email:

Pages:

DATE	20-Jul-21	PERSONNEL	C. Thomas	LOCATION / ID	Maroota NSW
TIME		MODEL	1400	SERIAL No	

1.Monthly		Equipment Required: Soft Cleaning Brush & lint free cloth, Philips Screwdriver.			
Before		After		Reference	Notes
1a) F (Flow Warning)		1g) OK		Sect 7 O/M	Main flow only 2.71 upon arrival. B
1b) 4		1h) 4		Sect 4.2.1 O/M	
1c) Filter Load	74%	1i) Filter Load	17%	Sect 3.1 O/M	
1d) Noise	0.046	1j) Noise	0.058	Sect 3.1.1 O/M	
1e) Frequency	252.43005	1k) Frequency	254.78155	Sect 3.1.1 O/M	
1f) Inlet cleaned upon filter change		Y		Appendix G O/M	

Change the sample filter if above 85%. Clean PM10 Inlet every filter change.

2.Qaurtley	Equipment required: Flow audit adaptor, Flow cap splitter, flow Calibrator, Temperature probe, Barometer			
1) Complete Monthly	Completed	Y	As Above	Remove Main flow filter & replace with new one install with arrow facing down or against the flow. Replace Aux (bypass) filter with one from main flow. Figure 12-1 O/M
2a) Check or change filters	Completed	Y	Sect 12.1.1 O/M	
2c) Flow Audit	Completed	Y	Sect 5.3.3 O/M	Figures 5-11,12,13 O/M
2d) Leak Check	Completed	Y	Sect 3.4 O/M	Figures 3-31,32,33,34
2e) Pump Check	Completed	N	Sect 3.1.5 S/M	pump vacuum advised as ok by cu

2c. Flow Audit	**Measured**	**Tolerance**	**2d.Leak Check**	**Pump On**	**Flow**	**Pump Off**	**Flow**
Total Flow	17.96	16.67 +/- 1 l/m	Main Flow	0.35	< 0.15	0.06	< 0.15
Main flow	2.98	3 +/- 0.2 l/m	Aux Flow	0.35	< 0.60	0.08	< 0.60

2e. Pump check		
Filter loading %		Filter loading must be > 140%, if not rebuild or replace pump

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3.Bi Annual	Equipment Required: Flow calibrator, Temperature probe, Barometer			
1) Complete Monthly	Completed	Y / N / NA	As above	Notes
2) Complete Quartley	Completed	Y / N / NA	As above	
3a) Change Large DFU's	Completed	Y / N / NA	As above	
3b) Verify Amb Temp & Pres	Completed	Y / N / NA	Sect 5.3.1 O/M	Figure 5-10 O/M
3c) Flow Controller Software Calibration	Completed	Y / N / NA	Sect 3.5.1 S/M	

3b. Verification	Measured	Displayed	Range	Adjusted
Amb Temp °C			.+/- 2°C	Y / N / NA
Amb Pres Atm			.+/- 13.4	Y / N / NA

3c.	Settings	Ambient	
T A/S Left Side °C			Settings on left side must be changed to ambient conditions
P A/S Left Side Atm			

3c. Software Cal	F Adj Before	Flow Before l/m	F Adj After	Flow After l/m	Adjust flow to 2% of set point But no more than 10% of F Adj default of 1.000. Failure requires hardware Calibration (annual as below)
Main Flow 3 l/m					
Aux Flow 13.67 l/m					

NOTE : Change T A/S & P A/S BACK TO 99 & 9

4.Annual	Equipment required: Flow calibrator, temperature probe, barometer, Oscilloscope, digital multimeter, jumper lead, KO verification kit, cleaning equipment, large filter.			
1) Complete Monthly	Completed	Y / N / NA	As above	Notes
2) Complete 3 Monthly	Completed	Y / N / NA	As above	
2a) Change Large DFU's	Completed	Y / N / NA	As above	
4a) Amplifier Board tuning	Completed	Y / N / NA	Sect 3.2.2 S/M	

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Client: Cbased

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Pages:

4.Annual	Equipment required: Flow calibrator, temperature probe, barometer, Oscilloscope, digital multimeter, jumper lead, KO verification kit, cleaning equipment, large filter.			
4b) Analogue Output Calibration	Completed	Y / N / NA	Sect 3.2.1 S/M	
4c) Analogue Input Calibration	Completed	Y / N / NA	Sect 3.2.1 S/M	
4d) Amb Temp & Amb Pres Calibration	Completed	Y / N / NA	Sect 3.2.3-4 S/M	
4e) Flow Controller Hardware Calibration	Completed	Y / N / NA	Sect 3.5.2 S/M	
4f) Mass Transducer Calibration Verification	Completed	Y / N / NA	Sect 3.2.5 S/M	
4g) 24 hr zero check	Completed	Y / N / NA	N/A	
4h)Clean sample tube	Completed	Y / N / NA	Sect 12.1.2 O/M	
4i) Check memory battery	Completed	Y / N / NA	Sect 12.1.2 O/M	

4a. Amplifier board	TP0	TP0	TP1	TP2	TP3	TP4	TP5
Reading							
Reading							
Reading							
Expected	.-4.2v	0.5vpp	9vpp	20vpp	0.6-1.5vpp	.-1.000v	16vpp

NOTE: Repeat Steps above until all parameters are in range.

4b. Analogue outputs	0	1	2	3	4	5	
Reading VDC							
Set Point VDC	**9.000v**	**9.000v**	**9.000v**	**9.000v**	**9.000v**	**9.000v**	

4c. Analogue Inputs							
1	2	3	4	5	6	7	9
90.00	**90.00**	**90.00**	**90.00**	**90.00**	**90.00**	**90.00**	**90.00**

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4d. Temp & Press cal	Measured	Displayed		Measured	Displayed
Amb Temp °C			Adjust Input 8		
Amb Pres Atm			Adjust R509		

4e.	Settings	Ambient	
T A/S Left Side °C			
P A/S Left Side Atm			If settings on the left were changed set back to 99 & 9

4e.Flow Calibration	Measured	Adjust Pots	Adjusted	Adjust zero pot for 3 l/m	Measured
Main Flow 0.5 l/m		Zero (R119)	N	Main Flow 3 l/m +/- 0.3	2.98
Main Flow 4.5 l/m		Span (R126)	N	**Adjust zero pot for 13.67 l/m**	
Aux Flow 2.0 l/m		Zero (R119)	Y	Aux Flow 13.67 l/m +/- 0.2	
Aux Flow 18.0 l/m		Span (R126)			

NOTE: Change T A/S Back 99 & P A/S back to 9.

4f. KO Verification KO	Audit filter weight	Frequency with no filter	Frequency with audit filter	Audit KO	Difference < 2.5%	If Difference is +/- 2.4% Re do step 4f.

4g. 24 Hr Zero				Notes
START DATE		START TIME		Remove Inlet & Install flow audit adaptor on Inlet. Install a large DFU Filter with some flexible hose onto the flow audit adaptor.
END DATE		FINISH TIME		

Engineer's Name: C. Thomas **Engineer's Signature:** C 26 **Date:**

Appendix C – Groundwater and Surface Water Monitoring Results

Groundwater Quality

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10056

Date Issued: 23/12/2020 Revision Number: 00

Site/Job: Old Northern Rd 6 Mnth Ground Water

Client: Dixon Sand Pty Ltd
Address PO Box 4019
Pitt Town NSW 2756
Contact David Dixon

The following 11 sample(s) were received on 11/12/2020

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	11/12/2020	10056/1	Water	
BH2	11/12/2020	10056/2	Water	
BH3	11/12/2020	10056/3	Water	
BH6	11/12/2020	10056/4	Water	
BH7	11/12/2020	10056/5	Water	
BH8	11/12/2020	10056/6	Water	
BH9	11/12/2020	10056/7	Water	
MW1	11/12/2020	10056/8	Water	
MW2	11/12/2020	10056/9	Water	
MW3	11/12/2020	10056/10	Water	
MW5	11/12/2020	10056/11	Water	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)

Approved by: Anthony Crane
Laboratory Manager

Results have been approved and report finalised on 23/12/2020.

Test Report Number: 10056

Date Issued: 23/12/2020 Revision No: 00

Results

Field Tests	Method	Units	10056/1 BH1 11/12/2020	10056/2 BH2 11/12/2020	10056/3 BH3 11/12/2020	10056/4 BH6 11/12/2020	10056/5 BH7 11/12/2020
Depth to Water	AS5667.11	m(bTOC)	>59.40	37.90	33.68	32.50	22.67
Temperature	Temp	°C	18.9	18.0	18.0	17.6	18.6
pH	APHA 4500-H B	pH Units	6.7	6.0	6.1	5.1	4.9
Electrical Conductivity	APHA 2510 B	µS/cm	207	252	198	125	259

Field Tests	Method	Units	10056/6 BH8 11/12/2020	10056/7 BH9 11/12/2020	10056/8 MW1 11/12/2020	10056/9 MW2 11/12/2020	10056/10 MW3 11/12/2020
Depth to Water	AS5667.11	m(bTOC)	26.72	36.13	12.51	21.65	22.67
Temperature	Temp	°C	[NT]	17.7	18.4	16.4	17.8
pH	APHA 4500-H B	pH Units	[NT]	5.4	4.2	3.8	5.3
Electrical Conductivity	APHA 2510 B	µS/cm	[NT]	272	208	603	136

Field Tests	Method	Units	10056/11 MW5 11/12/2020
Depth to Water	AS5667.11	m(bTOC)	6.34
Temperature	Temp	°C	18.0
pH	APHA 4500-H B	pH Units	5.4
Electrical Conductivity	APHA 2510 B	µS/cm	190

Total Dissolved Solids	Method	Units	10056/1 BH1 11/12/2020	10056/2 BH2 11/12/2020	10056/3 BH3 11/12/2020	10056/4 BH6 11/12/2020	10056/5 BH7 11/12/2020
Total Dissolved Solids	AS3550.4	mg/L	175	124	126	63	164

Total Dissolved Solids	Method	Units	10056/7 BH9 11/12/2020	10056/8 MW1 11/12/2020	10056/9 MW2 11/12/2020	10056/10 MW3 11/12/2020	10056/11 MW5 11/12/2020
Total Dissolved Solids	AS3550.4	mg/L	162	149	365	98	99

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

Sampling Report Number: 10056

Date Issued: 23/12/2020 Revision No: 00

Sampling Conditions: Cloudy 17°-19°C

Lab ID	Client Sample Reference	Licence Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
10056/1	BH1		T.Walker	11/12/2020 9:39 AM	AS5667.11, Bail	AS5667.1
10056/2	BH2		T.Walker	11/12/2020 11:10 AM	AS5667.11, Pump	AS5667.1
10056/3	BH3		T.Walker	11/12/2020 11:39 AM	AS5667.11, Pump	AS5667.1
10056/4	BH6		T.Walker	11/12/2020 10:34 AM	AS5667.11, Pump	AS5667.1
10056/5	BH7		T.Walker	11/12/2020 1:32 PM	AS5667.11, Pump	AS5667.1
10056/6	BH8		T.Walker	11/12/2020 3:03 PM	AS5667.11, Bail	AS5667.1
10056/7	BH9		T.Walker	11/12/2020 2:10 PM	AS5667.11, Pump	AS5667.1
10056/8	MW1		T.Walker	11/12/2020 1:47 PM	AS5667.11, Pump	AS5667.1
10056/9	MW2		T.Walker	11/12/2020 3:21 PM	AS5667.11, Bail	AS5667.1
10056/10	MW3		T.Walker	11/12/2020 10:50 AM	AS5667.11, Pump	AS5667.1
10056/11	MW5		T.Walker	11/12/2020 10:01 AM	AS5667.11, Pump	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
10056/1	BH1	
10056/2	BH2	
10056/3	BH3	
10056/4	BH6	
10056/5	BH7	
10056/6	BH8	Depth to bottom/roots, unable to obtain sample
10056/7	BH9	
10056/8	MW1	
10056/9	MW2	
10056/10	MW3	
10056/11	MW5	

Sampling procedures have been approved and report finalised on 23/12/2020.
Where method is "unknown" sampling procedures are not endorsed

Well Parameters:

Client: Dixon Sand Pty Ltd

Site/Job: Old Northern Rd 6 Mnth Ground Water

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	312290	6297039			
BH2	313429	6297202			
BH3	313808	6297093			
BH6	313153	6296833			
BH7	313097	6296495			
BH8	313435	6296617			
BH9	313294	6296504			
MW1	313092	6296499			
MW2	313417	6296733			
MW3	313161	6296838			
MW5	312460	6296903			

Well ID	Date Well Measured	Case Height (m)	Depth to bottom m(bTOC)	Recharge Rate	Approx Volume (L)
BH1	2/12/2019	0.68	>60	Slow	unkown
BH2	2/12/2019	0.57	>60	slow	unkown
BH3	2/12/2019	0.56	>60	Slow	Unkown
BH6	2/12/2019	0.52	>60	Slow	Unkown
BH7	2/12/2019	0.53	>60	Slow	Unknown
BH8	2/12/2019	0.73	27.53	Slow	2
BH9	2/12/2019	0.64	>60	Medium	Unkown
MW1	2/12/2019	0.28	15.53	Medium	12
MW2	2/12/2019	0.45	24.53	Slow	7.5
MW3	2/12/2019	0.88	34.57	Slow	2.5
MW5	2/12/2019	0.70	21.19	Slow	28

Note: NATA accreditation does not cover information provided in this section

*Where indicated AHD from ground level (m) estimated based on handheld GPS

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 11046

Date Issued: 11/06/2021 Revision Number: 00

Site/Job: Old Northern Rd 6 Mnth Ground Water

Client: Dixon Sand Pty Ltd
Address PO Box 4019
Pitt Town NSW 2756
Contact David Dixon

The following groundwater sample(s) were received on 2/06/2021

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	2/06/2021	11046/1	Water	
BH2	2/06/2021	11046/2	Water	
BH3	2/06/2021	11046/3	Water	
BH6	2/06/2021	11046/4	Water	
BH7	2/06/2021	11046/5	Water	
BH8	2/06/2021	11046/6	Water	
BH9	2/06/2021	11046/7	Water	
MW1	2/06/2021	11046/8	Water	
MW2	2/06/2021	11046/9	Water	
MW3	2/06/2021	11046/10	Water	
MW5	2/06/2021	11046/11	Water	

The sample(s) have been tested as received and the following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)

Approved by: Anthony Crane
Laboratory Manager

Results have been approved and report finalised on 11/06/2021.

Test Report Number: 11046

Date Issued: 11/06/2021 Revision No: 00

Results

Field Tests	Method	Units	11046/1 BH1 2/06/2021	11046/2 BH2 2/06/2021	11046/3 BH3 2/06/2021	11046/4 BH6 2/06/2021	11046/5 BH7 2/06/2021
Depth to Water	AS5667.11	m(bTOC)	59.88	36.91	32.85	31.65	21.85
Temperature	Temp	°C	18.5	17.9	17.8	17.3	18.1
pH	APHA 4500-H B	pH Units	7.0	6.1	6.1	4.9	4.6
Electrical Conductivity	APHA 2510 B	µS/cm	174	289	206	130	263

Field Tests	Method	Units	11046/6 BH8 2/06/2021	11046/7 BH9 2/06/2021	11046/8 MW1 2/06/2021	11046/9 MW2 2/06/2021	11046/10 MW3 2/06/2021
Depth to Water	AS5667.11	m(bTOC)	26.71	34.99	12.26	20.13	22.41
Temperature	Temp	°C	[NT]	17.9	18.0	16.3	17.2
pH	APHA 4500-H B	pH Units	[NT]	5.5	4.2	3.8	5.7
Electrical Conductivity	APHA 2510 B	µS/cm	[NT]	281	200	576	111

Field Tests	Method	Units	11046/11 MW5 2/06/2021
Depth to Water	AS5667.11	m(bTOC)	6.16
Temperature	Temp	°C	18.5
pH	APHA 4500-H B	pH Units	5.0
Electrical Conductivity	APHA 2510 B	µS/cm	162

Total Dissolved Solids	Method	Units	11046/1 BH1 2/06/2021	11046/2 BH2 2/06/2021	11046/3 BH3 2/06/2021	11046/4 BH6 2/06/2021	11046/5 BH7 2/06/2021
Total Dissolved Solids	AS3550.4	mg/L	123	129	140	100	145

Total Dissolved Solids	Method	Units	11046/7 BH9 2/06/2021	11046/8 MW1 2/06/2021	11046/9 MW2 2/06/2021	11046/10 MW3 2/06/2021	11046/11 MW5 2/06/2021
Total Dissolved Solids	AS3550.4	mg/L	155	103	321	64	93

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 11046

Date Issued: 11/06/2021 Revision No: 00

Sampling Conditions: Fine, 17°- 21°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
11046/1	BH1		T & D.Walker	2/06/2021 10:54 AM	AS5667.11, Bail	AS5667.1
11046/2	BH2		T & D.Walker	2/06/2021 12:28 PM	AS5667.11, Pump	AS5667.1
11046/3	BH3		T & D.Walker	2/06/2021 12:54 PM	AS5667.11, Pump	AS5667.1
11046/4	BH6		T & D.Walker	2/06/2021 11:48 AM	AS5667.11, Pump	AS5667.1
11046/5	BH7		T & D.Walker	2/06/2021 2:39 PM	AS5667.11, Pump	AS5667.1
11046/6	BH8		T & D.Walker	2/06/2021 3:10 PM	AS5667.11, Bail	AS5667.1
11046/7	BH9		T & D.Walker	2/06/2021 2:21 PM	AS5667.11, Pump	AS5667.1
11046/8	MW1		T & D.Walker	2/06/2021 2:52 PM	AS5667.11, Pump	AS5667.1
11046/9	MW2		T & D.Walker	2/06/2021 3:31 PM	AS5667.11, Bail	AS5667.1
11046/10	MW3		T & D.Walker	2/06/2021 12:08 PM	AS5667.11, Pump	AS5667.1
11046/11	MW5		T & D.Walker	2/06/2021 11:22 AM	AS5667.11, Pump	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
11046/1	BH1	
11046/2	BH2	
11046/3	BH3	
11046/4	BH6	
11046/5	BH7	
11046/6	BH8	26.75 to bottom (insufficient water to sample)
11046/7	BH9	
11046/8	MW1	
11046/9	MW2	
11046/10	MW3	
11046/11	MW5	

Sampling procedures have been approved and report finalised on 11/06/2021.
Where method is "unknown" sampling procedures are not endorsed

Well Parameters:

Client: Dixon Sand Pty Ltd

Site/Job: Old Northern Rd 6 Mnth Ground Water

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	312290	6297039			
BH2	313429	6297202			
BH3	313808	6297093			
BH6	313153	6296833			
BH7	313097	6296495			
BH8	313435	6296617			
BH9	313294	6296504			
MW1	313092	6296499			
MW2	313417	6296733			
MW3	313161	6296838			
MW5	312460	6296903			

Well ID	Date Well Measured	Case Height (monument) (m)	Depth to bottom m(bTOC)	Recharge Rate	Approximate Volume (L)
BH1	2/12/2019	0.68	>60	Slow	unkown
BH2	2/12/2019	0.57	>60	slow	unkown
BH3	2/12/2019	0.56	>60	Slow	Unkown
BH6	2/12/2019	0.52	>60	Slow	Unkown
BH7	2/12/2019	0.53	>60	Slow	Unknown
BH8	2/12/2019	0.73	27.53	Slow	2
BH9	2/12/2019	0.64	>60	Medium	Unkown
MW1	2/12/2019	0.28	15.53	Medium	12
MW2	2/12/2019	0.45	24.53	Slow	7.5
MW3	2/12/2019	0.88	34.57	Slow	2.5
MW5	2/12/2019	0.70	21.19	Slow	28

Note: NATA accreditation does not cover information provided in this section

*Where indicated AHD from ground level (m) estimated based on handheld GPS

Surface Water Quality

WATER SAMPLING FIELD SHEET

Project Environmental Services

Sampler Name	Melissa Mass	**Project No.**	SW19	**Project Name**	Dixon Sand - ONR
Date of Survey	18/09/2020	**Weather**	Cloudy, dry, cool		

Data Collection

Sample ID	Water Body Type *	Time	Flow	Field Parameters & Observations			Comments **
				pH	EC	Turbidity	
SW19	Creek	10.20am	Moderate	4.79	0.42mS	170ppm	Temp. 17.3°C

9727/1
ONR surface water
SW19
18/09/2020

Notes: * Borehole = BH, Stream = ST, Lake = LA, Sediment Basin = SB, Dam = DA
** Comments: Odour, Colour, Surface film, Obvious Contamination

Laboratory Details

Laboratory Name	VGT	**Contact Name**	Terry Walker	**Contact No.**	0427 466 561
Sample Sent Date	18/09/2020	**Delivery Method**	Picked up by Terry	**Result Due**	Standard Report
Analysis Suites	* EC * Turbidity * TSS		Received TW 18/9/20 14:00		

Report Number: 9727

Date Issued: 21/09/2020 Revision Number: 00

Site/Job: ONR surface water sample

Client: Dixon Sand Pty Ltd
Address PO Box 4019
Pitt Town NSW 2756
Contact David Dixon

vgt Laboratories Pty Ltd
PO Box 2335 Greenhills NSW 2323
P (02)4028 6412 E mail@vgt.com.au
www.vgt.com.au ABN 77 621 943 600

The following 1 sample(s) were received on 18/09/2020

Client Sample Reference	Licence Ref /GPS	Date Sampled	Lab ID	Matrix	General Comments
SW19		18/09/2020 10:20 AM	9727/1	Water	Sampled by Melissa Mass

The sample(s) have been tested as received and the following reports are included:

- Test Report: Results relate to sample(s) as received
- Chain of Custody (if available)

Anthony Crane
Laboratory Manager

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

Test Report Number: 9727

Date Issued: 21/09/2020 Revision No: 00

Results

Physical Components	Units	Method	PQL	9727/1 SW19 18/09/2020
Temperature	℃	Temp	*0.1*	18.4
pH	pH Units	APHA 4500-H B	*0.1*	4.7
Electrical Conductivity	µS/cm	APHA 2510 B	*50*	137
Turbidity	NTU	APHA 2130 B	*0.1*	4.7
Total Suspended Solids	mg/L	AS3550.4	*2*	4

Report Comments:

Note: # Where present, indicates NATA accreditation does not cover the performance of this service.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Holding times for some or all of the tests listed below are outside the period recommended in the method: pH (0.25 hrs), TSS, Turbidity (24 hrs).
This may be important to the interpretation of the results.

NATA Accredited Laboratory – 20375

Accredited for compliance with ISO/IEC 17025 – Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Results have been approved and report finalised on 21/09/2020

10162/1
Old Northern Rd - Surface
SW19
11/12/2020

ation:

Deliver samples to: 4/30 Glenwood Drive, Thornton, NSW 2322
Contact: (02) 4028 6412, lab@vgt.com.au

vgt Laboratories Pty Ltd

Company Dixon Sand **Project Name/Order No:**
Contact Name,Email,Phone Hanny Churcher - 0405 844 207 **Quote Suppplied?**
Report Address environment@dixonsand.com.au
Invoice Address accounts@dixonsand.com.au - Cc environment@dixonsand.com.au

Date/Time Submitted to VGT: **Date Required:**
Reliquished by: Received by: TW 11/12/20 15:45

VGT ID	Sample Description	Sampling Date & Time	Sampled By (Print Name)	Discharging Y/N /NR (Not Relevant)	Tests Required	Comments Required on Report
	SW19	11/12/2020 8-45am	mick munnock	N	PH, TSS, EC, Turbidity	Field test results 7.12ph

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10162

Date Issued: 14/12/2020 Revision Number: 00

Site/Job: Old Northern Rd - Surface Water

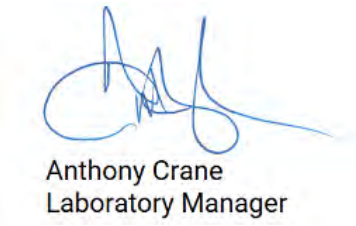
Client: Dixon Sand Pty Ltd
Address PO Box 4019
Pitt Town NSW 2756
Contact David Dixon

The following 1 sample(s) were received on 14/12/2020 09:59

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
SW19	11/12/2020 8:45 AM	10162/1	Water	Field test results pH 4.12

The sample(s) have been tested as received and the following reports are included:

- Test Report: Results relate to sample(s) as received
- Chain of Custody (if available)



Approved by:

Results have been approved and report finalised on 14/12/2020.

Test Report Number: 10162

Date Issued: 14/12/2020 Revision No: 00

Results

pH/EC/TSS/Turb	Method	Units	10162/1 SW19 11/12/2020
Temperature	Temp	°C	21.6
pH	APHA 4500-H B	pH Units	4.6
Electrical Conductivity	APHA 2510 B	µS/cm	195
Turbidity	APHA 2130 B	NTU	4.5
Total Suspended Solids	AS3550.4	mg/L	<2

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 − Testing.

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 10584

Date Issued: 10/03/2021 Revision Number: 00

Site/Job: ONR surface water sample

Client: Dixon Sand Pty Ltd
Address PO Box 4019
Pitt Town NSW 2756
Contact David Dixon

The following 1 sample(s) were received on 10/03/2021 07:44

Client Sample Reference	Date Sampled	Sampled by	Lab ID	Matrix	Client Comments
SW19	9/03/2021 11:30 AM	Melissa Mass	10584/1	Water	Field pH 4.55

The sample(s) have been tested as received and the following reports are included:

- Test Report: Results relate to sample(s) as received
- Chain of Custody (if available)

Approved by: Anthony Crane
Laboratory Manager

Results have been approved and report finalised on 10/03/2021.

Test Report Number: 10584

Date Issued: 10/03/2021 Revision No: 00

Results

Physical Components	Method	Units	10584/1 SW19 9/03/2021
Temperature	Temp	°C	20.7
pH	APHA 4500-H B	pH Units	4.3
Electrical Conductivity	APHA 2510 B	µS/cm	174
Turbidity	APHA 2130 B	NTU	0.20
Total Suspended Solids	AS3550.4	mg/L	<2

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

[NT]: Not tested

Holding times for some or all of the tests listed below are outside the period recommended in the method: pH (0.25 hrs), TSS, Turbidity (24 hrs).
This may be important to the interpretation of the results.

Chain of Custody Information:

Deliver samples to: 4/30 Glenwood Drive, Thornton, NSW 2322

Contact: (02) 4028 6412, lab@vgt.com.au

vgt Laboratories Pty Ltd

Company Dixon Sand **Project Name/Order No:** ONR

Contact Name,Email,Phone Hunny Churcher 0405 844 207 **Quote Suppplied?**

Report Address environment@dixonsand.com.au

Invoice Address environment@dixonsand.com.au

Date/Time Submitted to VGT: **Date Required:**

Reliquished by: Received by:

VGT ID	Sample Description	Sampling Date & Time	Sampled By (Print Name)	Discharging Y/N /NR (Not Relevant)	Tests Required	Comments Required on Report
	SW1a	1/06/2021 10:20am	melissa mass	N/R	Ph, TSS, Turbidity	
	Twin Ponds	1/06/2021 10:45am	melissa mass	N/R	Ph, TSS, Turbidity	Please fast track results within 24 hours.

WATER SAMPLING FIELD SHEET

Project Environmental Services

Sampler Name	Melissa Mass	**Project No.**		**Project Name**	ONR
Date of Survey	1/06/2021	**Weather**	Cool, Sunny, no wind		

Data Collection

Sample ID	Water Body Type *	Time	Flow	Field Parameters & Observations			Comments **
				pH	EC	Turbidity	
mel ph SW19	ST	10.20	moderate	5.65	0.26mS	130 (ppm500)	Field measurement
Hunny Ph SW19	ST	10.20	moderate	5.62			
				((4.80 in cup))			
mel ph Twin Ponds	DA	10.45	—	5.38 in dam	0.30mS	150 (ppm500)	Field measurement
Hunny ph Twin Ponds	DA	10.45	—	4.66			

Notes: * Borehole = BH, Stream = ST, Lake = LA, Sediment Basin = SB, Dam = DA
** Comments: Odour, Colour, Surface film, Obvious Contamination

Laboratory Details

Sent to

Laboratory Name	VCT	**Contact Name**	Terry Walker	**Contact No.**	
Sample Sent Date	1/06/2021	**Delivery Method**	Terry Pick up	**Result Due**	Fast track results for Twin Ponds.
Analysis Suites	Ph, Turbidity + TSS				

VGT Laboratories Pty Ltd.
ABN 77 621 943 600
NATA Accreditation 20375
Unit 4, 30 Glenwood Drive Thornton NSW 2322|
P: (02) 4028 6412 | **E:** lab@vgt.com.au | **www.vgt.com.au**

Report Number: 11063

Date Issued: 2/06/2021 Revision Number: 00

Site/Job: Old Northern Rd Surface Water

Client: Dixon Sand Pty Ltd
Address PO Box 4019
Pitt Town NSW 2756
Contact David Dixon

The following 2 sample(s) were received on 2/06/2021 08:19

Client Sample Reference	Date Sampled	Sampled by	Lab ID	Matrix	Client Comments
SW19	1/06/2021 10:20 AM	Melissa Mass	11063/1	Water	
Twin Ponds	1/06/2021 10:45 AM	Melissa Mass	11063/2	Water	

The sample(s) have been tested as received and the following reports are included:

- Test Report: Results relate to sample(s) as received
- Chain of Custody (if available)

Approved by: Anthony Crane
Laboratory Manager

Results have been approved and report finalised on 2/06/2021.

Test Report Number: 11063

Date Issued: 2/06/2021 Revision No: 00

Results

Physicals	Method	Units	11063/1 SW19 1/06/2021	11063/2 Twin Ponds 1/06/2021
Temperature	Temp	°C	18.9	18.8
pH	APHA 4500-H B	pH Units	4.7	4.3
Turbidity	APHA 2130 B	NTU	6.9	9.2
Total Suspended Solids	AS3550.4	mg/L	<5	7

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.
https://www.vgt.com.au/measurement-uncertainty

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Holding times for some or all of the tests listed below are outside the period recommended in the method: pH (0.25 hrs), TSS, Turbidity (24 hrs).
This may be important to the interpretation of the results.

Discharge Point – Water Quality

(No planned discharge during this reporting period)

Appendix D – Noise Compliance Reports

hutchison weller

Dixon Sand Pty Ltd

Old Northern Road Quarry, Maroota

Noise monitoring report
December 2020

Doc no. 19020-NV-RP-4-0



Dixon Sand Pty Ltd
Old Northern Road Quarry, Maroota

Title	Noise monitoring report
Document no.	19020-NV-RP-4-0
Revision	0
Date	23 December 2020
Author	John Hutchison
Reviewer	Scott Hughes
File path	I:\PROJECTS\19020 - Dixon Sand\02 Deliverables\021 Reports\Summer 2020\19020-NV-RP-4-0 Dixon Sand Old Northern Road Noise Monitoring Dec2020.docx

Hutchison Weller Pty Ltd
ABN 37 001 024 095
13/357 Military Road
Mosman NSW 2008

www.hutchisonweller.com

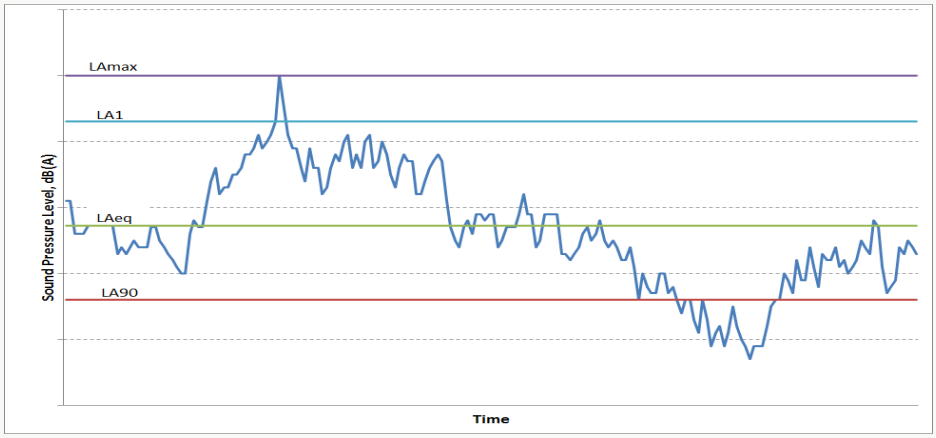
Revision history

0	23 December 2020	Draft report to client

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Definition of terms

Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation.
Decibel (dB)	A measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm (to base 10) of the ratio of a given sound power to a reference power.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
dB(C)	Unit used to measure 'C-weighted' sound pressure levels, an adjustment made to sound level to approximate low frequency noise between 10 Hz and 200 Hz.
EPA	Environment Protection Authority
Extraneous noise	Noise resulting from activities that are not typical of the area such as construction, and traffic generated by holiday periods or special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Noise level statistics	L_{A90} – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise. L_{Aeq} – The equivalent continuous A-weighted noise level—the level of noise equivalent to the energy average of noise levels occurring over a measurement period. L_{A1} – The A-weighted sound pressure level exceeded 1% of the monitoring period. L_{Amax} – The maximum A-weighted noise level associated with the measurement period. 
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
Receiver	The land use at which noise is heard
SLM	Sound Level Meter
Sound Power Level (SWL)	The A-weighted sound power level is a logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
Sound Pressure Level (SPL)	This is the level of noise, usually expressed in dB(A), as measured by a standard sound level meter (SLM) with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of noise. A technical definition for the sound pressure level, in decibels, is 20 times the logarithm (base 10) of the ratio of any two quantities related to a given sound pressure to a reference pressure (typically 20 µPa equivalent to 0 dB).
Tonal noise	Noise with perceptible and definite pitch or tone

1. Introduction

Dixon Sand Pty Ltd operates the Old Northern Road Quarry in Maroota, NSW (the Quarry). The Quarry is located off Old Northern Road, as illustrated in Figure 1.

Operations at the quarry include extraction of sand and sandstone blocks, processing by screening and grading and direct sales involving loading of trucks for shipment.

The Quarry operates under Development Consent 250-09-01 and Environment Protection Licence (EPL) 3916, which set noise limits for its operation and require noise monitoring to be completed on a six-monthly basis to ensure compliance with the conditions.

Hutchison Weller was commissioned by Dixon Sand to undertake the six-monthly noise monitoring in accordance with the conditions of consent, EPL and requirements of the Noise Management Plan.

This document outlines the consent conditions, monitoring methodology and results of the monitoring undertaken on 9 December 2020.



Figure 1 Location of the Quarry

2. Noise compliance criteria

Conditions 1 and 2 of Schedule 3 of development consent DA250-09-01 outline the Quarry operating hours and condition 3 defines the noise criteria for compliance.

1. The Applicant must comply with the operating hours set out in Table 1.

Table 1 Operating hours

Activity	Permissible hours
Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:

(a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and

(b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.

Table 2 Noise criteria dB(A)

Receiver	Averaging period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)
Any residence on privately owned land	LAeq (15 minute)	37	44
Any classroom at Maroota Public School	LAeq (1 hour)	-	45

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

3. Monitoring methodology

Operator-attended noise monitoring was undertaken on 9 December 2020 by John Hutchison of Hutchison Weller, an independent acoustic specialist. Monitoring locations included those described in the Quarry Noise Management Plan plus additional sensitive receivers, as illustrated in Figure 1 and summarised in Table 3.

Table 3 Monitoring locations

Receiver[1]	Address	Description
OR1	Maroota public school	Classroom closest to quarry operations
OR2	4624 Old Northern Road	Private residence
OR3	4634 Old Northern Road	Private residence
R2	4579 Old Northern Road	Private residence
R3	4567 Old Northern Road	Private residence
R4/5	4547 – 4543 Old Northern Road	Mid-point between private residence
OAS1	Lots 1 and 2 of the Quarry	At source monitoring, close to operations
OAS2	Lot 196 of the Quarry	At source monitoring, close to operations

Note 1: An agreement between Dixon Sand and receiver R1 is in place and, therefore, noise management levels defined by the development consent are not applicable.

Monitoring was conducted in accordance with procedures outlined in the Noise Policy for Industry and Section 6 of the Noise Management Plan.

At-receiver monitoring locations were within 30 metres of residential dwellings, whilst onsite measurement locations were selected for safe access and to be representative of the operations, without extraneous noise from sources such as traffic and insects.

Instrumentation included a Bruel & Kjaer Class 1 sound level meter (SLM), serial no. 3008237, field-calibrated prior to and following monitoring. The SLM was within current calibration, next due January 2022.

Monitoring was undertaken with the SLM set on a tripod at 1.5 metres above ground and measuring A-weighted sound pressure levels under fast response. Each measurement period was 15 minutes and recorded the LAeq, LA90 and LAmax statistics.

Meteorological data was recorded during each monitoring period adjacent to the Maroota public school, including wind speed, direction, temperature, relative humidity and sigma-theta (to establish the Pascall-Guifford stability category). This data was used to establish the meteorological conditions as being suitable for monitoring.

Where extraneous noise such as road traffic and insects were the dominant noise sources, making it impractical to discern the contribution of the Quarry to ambient noise levels, noise levels measured at alternative locations closer to the Quarry were utilised, in line with procedures outlines in Noise Policy for Industry. This involved extrapolation from the near-distance location to the sensitive receiver location.

4. Monitoring results

4.1 Attended measurements

Results of noise monitoring for each location are presented in Table 4.

In general, quarry operations are intermittently audible from all locations, with traffic noise and cicadas the dominant sources of noise for residents on the Old Northern Road.

Quarry operations fell into four categories representing the main sources of noise. These were:

- Sand processing and truck loading (main plant, front end loaders, trucks)
- Extraction of sand (involving screening, stockpiling with front end loader, moxie and dozer)
- Extraction of bulk sandstone by rock saw
- Dewatering activities with dewatering pumps

Depending on the receiver location, these sources played a varying role in contributing to the total noise level experienced.

Measured results indicated the shoulder period (from 6.00am to 7.00am) complied with the noise criteria at all measurement locations and quarry operations were only barely audible during breaks in traffic.

On-site measurements were taken to determine the noise level of various noise sources without the influence of traffic noise. Measurements were undertaken over 15-minute periods to establish representative sound power levels of the operation to allow extrapolation to receiver locations where background noise was too high to discern quarry noise contributions. This is discussed further in Section 4.3.

During the day (standard hours), measurement at the school and residential receivers established insects and traffic were the dominant source of noise in the area and heavily influenced the measured Leq, 15-minute noise levels. However, observations during breaks in traffic indicated quarry noise was faintly audible over the background level. Due to the continuous cicada drone, it was not possible to estimate contributions from the quarry and their compliance with the criteria *in situ,* requiring extrapolation from at-source measurements.

4.2 Modifying factors

No tonal, impulsive or low frequency noise characteristics were observed during the monitoring period. Therefore, application of modifying factors is not appropriate in this instance.

Table 4 Monitoring results

Monitoring period	Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
				LAeq	LA90	LAmax			
Shoulder (6.00am to 7.00am)	5.55am	OR3	37	44.3	38.4	57	36-37	Occasional traffic on access road ~45-51 dBA for short periods ONR traffic intermittent ~ 46 – 50 dBA Quarry generally inaudible or barely audible at ambient level of ~38-39 dBA	Clear sky and calm breeze Temperature 10°C Neutral conditions (Class C/D) to begin then extremely unstable conditions (A-class) after sunrise.
	6.15am	OR2		52.2	39.2	66.1	35-36	Light vehicles on access road ~ 42-43 dbA (few) ONR dominant ambient noise source ~ 54 – 66 dBA Truck idling at processing plant audible when ambient level drops to 38 dBA Processing plant just audible at 38 – 39 dBA FEL rev to 45 dBA (once)	
	6.35am	R3		53.6	38.4	76.5	34-35	Traffic on ONR is dominant noise sources ~48-63 for light vehicles and ~68 for heavies Quarry not visible and only barely audible at ambient level less than 38 dBA, which also includes birds and frogs.	
	6.54am	R4/5		64.6	40.9	86.6	34-35	Quarry not visible and ONR dominant ~72 – 77 dBA Leaf blower at the school ~45-46 Quarry briefly audible at ambient level of ~38 dBA.	

Monitoring period	Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
				LAeq	LA90	LAmax			
Day (7.00am to 6.00pm)	8:13am	OAS1	N/A	59.3	57.8	65.2	45-47	Processing plant dominant source of noise in this location (cicadas a distant background) Mostly screening noise ~60-62 dBA @ 90m with truck loading, 63-34 dBA Truck ~65 @ 20m	Light breeze from SSW @ 4-12km/h Temperature 10°C Clear sky Extremely unstable (A class)
	9:27am	OAS2	N/A	66.8	66.0	73.7	66	Quarry noise is main source Cicadas only minor influence in higher frequencies ~56 dB @ 4 kHz Screen is dominant plant noise ~67 dBA @139 m Bucket scraping intermittent ~ 71 – 74 dBA 1 saw operating but inaudible – shielded by bulk of excavator. 2nd saw not operating Screen shielded a little by stockpile	

Monitoring period	Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
				LAeq	LA90	LAmax			
Day (7.00am to 6.00pm)	10:02am	OR3	44	66.7	65.2	69.5	See Section4.3	Cicadas are awake and noisy ~ 66 – 69 dBA ONR audible at ~ 68-69 dBA Quarry occasionally audible but long break between	Light breeze from SSW @ 3 – 9 km/h Temperature 11-12°C Clear sky Extremely unstable (A class)
	10:32am	OR2		55.2	52.8	65.6	See Section4.3	Cicadas steady ~ 54-55 dBA ONR dominant ~ 59-60 dBA Goats bleating intermittently ~ 60dBA Noise from pit faintly audible when no traffic but cicadas still heavy influence Occasional traffic on access road ~ 61 -64 dBA	Light breeze from WSW to WNW @ 1 – 10 km/h Temperature 25°C Clear sky Extremely unstable (A class)
	10.54am	R2		62.0	67.9	82.9	See Section4.3	Cicadas dominant ~ 66-67 dBA Can barely hear engine noise from quarry which is essentially inaudible ~45 dBA Traffic on ONR ~74 – 76 dBA	

Monitoring period	Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
				LAeq	LA90	LAmax			
Day (7.00am to 6.00pm)	11:12am	R3		69.8	62.4	79.2	See Section4.3	Cicadas and traffic dominant sources. Cicadas ~ 68-69 dBA Traffic 71 – 77 dBA Brief beeper audible and single short occurrence of dozer tracks just audible.	
	11:42am	R4/5		66.3	59.7	85.3	See Section4.3	Distant lawnmower at neighbour Cicadas 62 -63 dBA quarry barely audible – some faint engine and track noise ONR ~ 77-82 dBA, motorbike 85 dBA	
	12:05pm	OR1		70.3	61.5	76.7	See Section4.3	Cicadas very loud ~ 72-73 dBA, occasionally dropping ot 60 dBA for a short time Traffic on ONR intermittent maximums ~ 75 dBA Quarry audible almost the entire time with lower frequencies compared to cicadas – can make out individual plant e.g screen, FEL and dozer	

4.3 Extrapolated measurements

A conclusive noise level attributable to the Quarry was not possible in all locations due to ambient noise levels affected by insects and road traffic. Therefore, measurements captured on-site without substantial influence from these sources were used to calculate sound pressure levels at each receiver.

Calculations were based on ISO 9613-2:1996 *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation,* which accounts for geometric spreading, air and ground absorption as well as barrier effects, assuming worst case meteorology of a gentle breeze from source to receiver and stable conditions.

Based on measurements described in Table 4, extrapolated noise results for each monitoring location are presented in Table 5. Results are shown for equipment operating in the pit, processing plant and stockpiling area.

Extrapolated results demonstrate the Quarry is compliant with the criteria for shoulder and daytime operations when all observed equipment is operating.

Table 5 Extrapolated monitoring results

Receiver	Noise criteria		Extrapolated noise level, LAeq, 15 minute	Comment
	Shoulder	Day		
OR1	-	45	44	Predicted levels correlate well with measured levels and all locations shown to comply with noise limits during the day period.
OR2	37	44	44	
OR3			39	
2			43	
3			44	
4/5			44	

4.4 Compliance summary

Results of attended monitoring and extrapolated noise levels demonstrate the following.

1. Observed operations during the day period were compliant with the noise criteria at each receiver under the meteorological conditions at the time.

2. Observed operations during the shoulder period were compliant with the noise criteria at all receivers under the meteorological conditions at the time.

hutchison weller

Dixon Sand Pty Ltd

Old Northern Road Quarry, Maroota

Noise monitoring report
June 2021

Doc no. 19020-NV-RP-5-0



Dixon Sand Pty Ltd
Old Northern Road Quarry, Maroota

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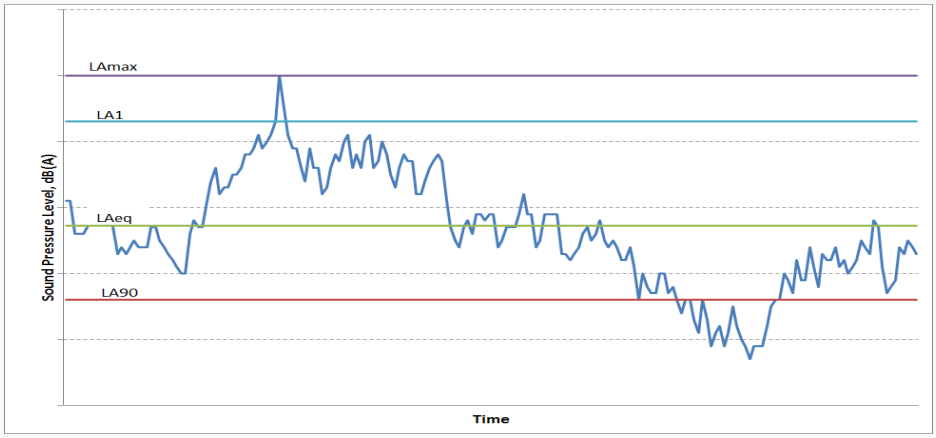
Revision history

0	25 June 2021	Report issued to client

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Definition of terms

Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation.
Decibel (dB)	A measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm (to base 10) of the ratio of a given sound power to a reference power.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
dB(C)	Unit used to measure 'C-weighted' sound pressure levels, an adjustment made to sound level to approximate low frequency noise between 10 Hz and 200 Hz.
EPA	Environment Protection Authority
Extraneous noise	Noise resulting from activities that are not typical of the area such as construction, and traffic generated by holiday periods or special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Noise level statistics	L_{A90} – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise. L_{Aeq} – The equivalent continuous A-weighted noise level—the level of noise equivalent to the energy average of noise levels occurring over a measurement period. L_{A1} – The A-weighted sound pressure level exceeded 1% of the monitoring period. L_{Amax} – The maximum A-weighted noise level associated with the measurement period. 
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
Receiver	The land use at which noise is heard
SLM	Sound Level Meter
Sound Power Level (SWL)	The A-weighted sound power level is a logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
Sound Pressure Level (SPL)	This is the level of noise, usually expressed in dB(A), as measured by a standard sound level meter (SLM) with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of noise. A technical definition for the sound pressure level, in decibels, is 20 times the logarithm (base 10) of the ratio of any two quantities related to a given sound pressure to a reference pressure (typically 20 µPa equivalent to 0 dB).
Tonal noise	Noise with perceptible and definite pitch or tone

1. Introduction

Dixon Sand Pty Ltd operates the Old Northern Road Quarry in Maroota, NSW (the Quarry). The Quarry is located off Old Northern Road, as illustrated in Figure 1.

Operations at the quarry include extraction of sand and sandstone blocks, processing by screening and grading and direct sales involving loading of trucks for shipment.

The Quarry operates under Development Consent 250-09-01 and Environment Protection Licence (EPL) 3916, which set noise limits for its operation and require noise monitoring to be completed on a six-monthly basis to ensure compliance with the conditions.

Hutchison Weller was commissioned by Dixon Sand to undertake the six-monthly noise monitoring in accordance with the conditions of consent, EPL and requirements of the Noise Management Plan.

This document outlines the consent conditions, monitoring methodology and results of the monitoring undertaken on 18 June 2021.



Figure 1 Location of the Quarry

2. Noise compliance criteria

Conditions 1 and 2 of Schedule 3 of development consent DA250-09-01 outline the Quarry operating hours and condition 3 defines the noise criteria for compliance.

1. The Applicant must comply with the operating hours set out in Table 1.

Table 1 Operating hours

Activity	Permissible hours
Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:

(a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and

(b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.

Table 2 Noise criteria dB(A)

Receiver	Averaging period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)
Any residence on privately owned land	LAeq (15 minute)	37	44
Any classroom at Maroota Public School	LAeq (1 hour)	-	45

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

3. Monitoring methodology

Operator-attended noise monitoring was undertaken on 18 June 2021 by John Hutchison of Hutchison Weller, an independent acoustic specialist and Member of the Australian Acoustical Society. Monitoring locations included those described in the Quarry Noise Management Plan plus additional sensitive receivers, as illustrated in Figure 1 and summarised in Table 3.

Table 3 Monitoring locations

Receiver[1]	Address	Description
OR1	Maroota public school	Classroom closest to quarry operations
OR2	4624 Old Northern Road	Private residence
OR3	4634 Old Northern Road	Private residence
R2	4579 Old Northern Road	Private residence
R3	4567 Old Northern Road	Private residence
R4/5	4547 – 4543 Old Northern Road	Mid-point between private residence
OAS1	Lots 1 and 2 of the Quarry	At source monitoring, close to operations
OAS2	Lot 196 of the Quarry	At source monitoring, close to operations

Note 1: An agreement between Dixon Sand and receiver R1 is in place and, therefore, noise management levels defined by the development consent are not applicable.

Monitoring was conducted in accordance with procedures outlined in the Noise Policy for Industry and Section 6 of the Noise Management Plan.

At-receiver monitoring locations were within 30 metres of residential dwellings, whilst onsite measurement locations were selected for safe access and to be representative of the operations, without extraneous noise from sources such as traffic and insects.

Instrumentation included a Bruel & Kjaer Class 1 sound level meter (SLM), serial no. 3008237, field-calibrated prior to and following monitoring. The SLM was within current calibration, next due January 2022.

Monitoring was undertaken with the SLM set on a tripod at 1.5 metres above ground and measuring A-weighted sound pressure levels under fast response. Each measurement period was 15 minutes and recorded the LAeq, LA90 and LAmax statistics.

Meteorological data was recorded during each monitoring period adjacent to the Maroota public school, including wind speed, direction, temperature, relative humidity and sigma-theta (to establish the Pascall-Guifford stability category). This data was used to establish the meteorological conditions as being suitable for monitoring.

Where extraneous noise such as road traffic and fauna (insects/frogs) were the dominant noise sources, making it impractical to discern the contribution of the Quarry to ambient noise levels, noise levels measured at alternative locations closer to the Quarry were utilised, in line with procedures outlines in Noise Policy for Industry (NSW EPA 2017). This involved extrapolation from the near-distance location to the sensitive receiver location, as described in Section 4.3.

4. Monitoring results

4.1 Attended measurements

Results of noise monitoring for each location are presented in Table 4.

In general, quarry operations were audible from all locations, with traffic the dominant source of noise for residents on the Old Northern Road.

Quarry operations fell into four categories representing the main sources of noise. These were:

- Sand processing and truck loading (main plant, front end loaders, trucks)
- Extraction of sand (involving ripping by dozer, and transport via moxie)
- Extraction of bulk sandstone by rock saw
- Dewatering activities with dewatering pumps

Depending on the receiver location, these sources played a varying role in contributing to the total noise level experienced.

Measured results indicated quarry operations during the shoulder period (from 6.00am to 7.00am) were audible but complied with the noise criteria at all measurement locations. A pump was audible as a steady noise during breaks in traffic on Old Northern Road and its contribution to ambient noise was close to the noise limit for the shoulder period at around 38 - 39 dBA. With a shoulder period limit of 37 dBA, operation of the pump slightly exceeded the limit. However, allowance of up to 2 dB is provided for in Section 11 of the Industrial Noise Policy whilst remaining compliant.

On-site measurements were taken to determine the noise level of various noise sources without the influence of traffic noise. Measurements were undertaken over 15-minute periods to establish representative sound power levels of the operation to allow extrapolation to receiver locations where background noise was too high to discern quarry noise contributions. This is discussed further in Section 4.3.

During the day (standard hours), measurement at the school and residential receivers established traffic was the dominant source of noise in the area and heavily influenced the measured Leq, 15-minute noise levels. However, quarry noise was audible over the background level with operation of a dozer ripping hard rock at time clearly audible. Due to ambient noise (traffic, birds, breeze in trees), it was not possible to estimate contributions from the quarry and their compliance with the criteria *in situ,* requiring extrapolation from at-source measurements.

4.2 Modifying factors

No tonal, impulsive or low frequency noise characteristics were observed during the monitoring period. Therefore, application of modifying factors is not appropriate in this instance.

Table 4 Monitoring results

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmax			
Shoulder (6.00am to 7.00am)								
5.57am	OR3	37	50.6	41.7	77.3	36-37	Frogs active in pond on property ~ 48 – 53 dBA Occasional traffic on access road ~52-54 dBA for short periods (approx. 5 trucks in 15 minutes) ONR traffic intermittent ~ 46 – 48 dBA Quarry generally inaudible or barely audible at ambient level of ~40-42 dBA	Clear sky and calm breeze Temperature 8-10°C Unstable conditions (A-B class).
6.17am	OR2		52.8	45.6	66.4	35-36	Heavy vehicles (around 9 in 15 minutes) ~ 58 – 60 dBA (around 9 in 15 minutes) ONR dominant ambient noise source LV 52 – 54 dBA and HV ~ 56– 64 dBA Processing plant audible	
6.37am	R3		61.6	43.7	82.9	38-39	Traffic on ONR is dominant noise sources ~68-71 for LV and 75-80 for HV Steady engine noise from quarry just audible during gaps in the traffic with ambient noise around 42 dBA– estimated level 38-39 dBA. This was a pump, which operated overnight.	
6.55am	R4/5		62.1	50.4	78.0	Not determined	ONR dominant ~75 – 76 dBA for HV Truck parked at front of school with chiller on for duration of monitoring event ~ 50 dBA. Quarry not audible.	

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmax			
Day period - (7.00am to 6.00pm)								
7:48am	OAS1	N/A	52.2	47.9	66.7	51 - 52	An excavator and screen were operating on the stockpile around 300 m from monitoring position Moxy on haul road to stockpiles ~ 150 metres @ ~53 dBA max passby Pit noise audible briefly Processing plant ~ 50 dBA	Light breeze from SSW @ 5 km/h 13km/h Temperature 11°C Clear sky unstable (B – C class)
9:30am	OAS2	N/A	60.0	55.6	69.3	59-60	Quarry noise is main source Dozer ripping hard sandstone and pushing up spoil in centre of pit Quad cut saws on sandstone blocks Cliff is around 15 metres high around works	Breeze from SSW @ 14-15 km/h Temperature 13°C Becoming overcast Unstable (B – C class)
10:27am	OR1	44	52.1	47.0	68.6	See Section 4.3	Quarry clearly audible with dozer ripping peaking at 49 – 51 Gentle breeze in trees ~ 51 – 53 Traffic on Old Northern Road fairly light ~59 – 62 intermittent Pump steady and just audible at ambient level 46 dBA School kids outside at 11am	Breeze from SSW@ 10-12-16 km/h Temperature 13°C Neutral

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmax			
11:35am	R4/5	44	60.6	46.0	78.0	See Section 4.3	Quarry audible at around 48 dBA and some bangs/clangs at 51 – 54 dBA Traffic dominant source with LV 62 – 69 and HV 68-72 dBA	conditions (C – D class)
11:53am	R3	44	59.8	48.1	59.8	See Section 4.3	Dozer clearly audible ~ 46-47 dBA with peaks ~56 – 57dBA Traffic noise remains dominant ~ 65 – 69 LV and 72 – 78 HV Breeze in trees	Breeze from SSW@ 13-16 km/h Temperature 14°C Neutral conditions (C – D class)
12:11pm	R2	44	60.5	47.8	78.8	See Section 4.3	Traffic dominant ~ 68 -73 dBA Quarry is audible with engines and clangs / beepers ~ 46 – 47 dBA Breeze in trees steady ~ 47 dBA	

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmax			
12:31pm	OR2	44	50.2	45.7	50.2	See Section4.3	Old Northern Road traffic is dominant. Barely audible pit noise – just audible when ambient levels 47 – 48 dBA Haul road 56 – 58 dBA Breeze in trees Screen and excavator on stockpile faintly audible at ambient level ~46 dBA	
12:53pm	OR3	44	48.2	45.3	59.0	See Section4.3	Old Northern Road traffic 53 – 57 dBA Haul road traffic ~ 50 – 52 dBA Breeze in trees ~46 – 47 dBA Screen on stockpile faintly audible at 42 – 43 dBA Pit not audible	

4.3 Extrapolated measurements

A conclusive noise level attributable to the Quarry was not possible in all locations due to ambient noise levels. Therefore, measurements captured on-site without substantial influence from traffic or breeze in trees were used to calculate sound pressure levels at each receiver.

Calculations were based on ISO 9613-2:1996 *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation,* which accounts for geometric spreading, air and ground absorption as well as barrier effects, assuming worst case meteorology of a gentle breeze from source to receiver and stable conditions.

Based on measurements described in Table 4, extrapolated noise results for each monitoring location are presented in Table 5. Results are shown for equipment operating in the pit, processing plant and stockpiling area.

Extrapolated results demonstrate the Quarry as measured demonstrates a contribution to the ambient noise environment that slightly exceeds the noise limit for the day period in most locations. The Industrial Noise Policy describes an exceedance of the noise limit by less than 2 dB as remaining compliant with the noise limits.

Table 5 Extrapolated monitoring results

Receiver	Noise criteria		Extrapolated noise level, LAeq, 15 minute	Comment
	Shoulder	Day		
OR1	-	45	46	Predicted levels correlate well with measured levels and most locations shown to slightly exceed noise limits during the day period.
OR2	37	44	45	
OR3			46	
2			43	
3			42	
4/5			45	

Dixon Sand described the operation of the dozer in the centre of the quarry ripping hard rock as uncommon, with ripping usually conducted closer to the working face of the pit and in softer material. Hard stone would usually be cut. For the foreseeable future, the scenario measured would not be repeated.

To estimate the reduction in noise likely to result from relocating the dozer into softer material near the quarry face, a return to 'business as normal', the noise model was adjusted. Results indicate the pit wall would provide additional screening and the dozer itself would be quieter. Predicted levels under the alternative scenario are summarised in Table 6. Results indicate the quarry would be compliant with noise limits under this scenario.

Table 6 Extrapolated monitoring results for alternative dozer scenario

Receiver	Noise criteria		Extrapolated noise level, LAeq, 15 minute	Comment
	Shoulder	Day		
OR1	-	45	42	Predicted levels correlate well with measured levels and most locations shown to slightly exceed noise limits during the day period.
OR2	37	44	44	
OR3			43	
2			42	
3			41	
4/5			44	

4.4 Compliance summary

Results of attended monitoring and extrapolated noise levels demonstrate the following.

1. Observed operations during the day period were slightly above but compliant with the noise limit at each receiver under the meteorological conditions at the time.

2. Observed operations during the shoulder period were slightly above but compliant with the noise criteria at all receivers under the meteorological conditions at the time.

3. A dozer ripping hard stone in the centre of the pit is not a typical operation. A typical scenario was modelled with the dozer closer to the pit wall working in softer material. This scenario demonstrated compliance with the noise limits and is reflective of previous monitoring surveys.

Appendix E – Monthly Site Inspection

OLD NORTHERN ROAD QUARRY
DIXON SAND, MAROOTA
MONTHLY SITE CONDITION CHECKLIST

This checklist is to be completed monthly by the Environmental Officer.
Completed checklists are to be retained and included in the Annual Review.

Date of inspection:	25/05/2021
Inspection by:	Melissa Mass
Measured monthly rainfall (mm)	Period 22/04/2021 - 25/05/2021 Rainfall = 68.4 mm

	Yes (✓) No (X) NA	Comments	Actions	Actions Complete (Date/Sign)
SEDIMENT CONTROLS				
Site checked for potential erosion issues or transport of sediment from batters, vehicle access points, excavations, haul roads, vegetation clearing etc.	✓	No erosion or transport of sediment noted this period.		M.M
Effectiveness and capacity of Erosion and Sediment controls checked (drains, basins, filters etc.)	✓	All drains, basins etc. clear.		M.M
Stockpiles located and maintained correctly	✓			
Tree clearance restricted to required area	N/A			
WATER QUALITY AND QUANTITY				
Water sample taken daily for quality testing prior to discharge of water. Water quality tested and EPL#3916 criteria for pH, TSS and turbidity complied prior to discharge.	N/A			
Weir: Daily volume of water discharged recorded.	N/A			
Monthly monitoring of surface water quality at SW19.	N/A	due June 2021		M.M.
Monthly monitoring of groundwater quality at six bores on Lots 1&2 and two bores on Lots 196.	N/A	due June 2021		M.M.
Monthly depth measurement of all groundwater bores and comparison with rainfall	✓	Depth measured 25/05/2021		M.M.
Monthly inspection of drainage & sediment controls including water storages, pumps, pipes and dams' walls	✓			
Any Fuel or oil spills reported and maintained	✓	No spills recorded this period		M.M.
Fuels/chemicals stored in bunded areas	✓	EPA approved bunding		M.M.
AIR QUALITY				
Continuous static dust (collected for analysis monthly)	✓	Static dust gauges Managed by VGT		M.M.
On site dust suppression	✓	Regular use of water cart when required.		M.M.
Loads covered entering and leaving site	✓	In compliance with TMP		M.M.

No burning of vegetation	N/A			
Wind speed, direction and rainfall recorded	✓	Weather Station located near school managed by CBASED		M.M.
NOISE				
Operation only during hours of operation	✓	comply with NMP, TMP and DA.		M.M.
No complaints received from school, residences or local community members.	✓	No complaints this period		M.M.
6 monthly monitoring at Maroota PS	✓	undertaken by VGT		M.M.
Bulldozer not being used concurrently with any other plant on strips 4, 5 and 6 of Lots 1 and 2 DP547255 at depths between EGL and 6 metres below EGL	N/A			
Bulldozer being used for clearing, topsoil stripping and bund construction on Lots 1 and 2 DP547255 only during [illegible] wind conditions	✓			
[illegible]tween 0-6 metres depth below EGL, dozer-dump truck combination replaced by excavator-dump truck combination to strip overburden on Strips 2-6 inclusive	✓			
Quarrying at ground level on Lot 196 not occurring during southwest to northwest winds	✓	In accordance with EPL		M.M
Construction and rehabilitation of eastern highwall of quarry within 250 metres of Maroota Public School occurring in school holiday periods only	N/A			
FLORA & FAUNA/ REHABILITATION				
Sightings of threatened species reported	N/A			
No disturbance of buffer/conservation areas	✓			
All buffer/conservation area [illegible]ing/marking intact	✓			
Rehabilitation undertaken to schedule	✓	monthly site visit by Bush-It	23 melaleuca deanei planted in Rehab zone	M.M.
Success of rehabilitation of buffers, conservation areas & rehabilitation areas	✓			
Rehabilitation near school during holidays	✓			
Flora and fauna monitoring program undertaken to schedule	✓			
ARCHAEOLOGY				
Stop work if sites located – OEH notified	✓	None this period		M.M.
WASTE AND SITE CONDITION				
No rubbish visible or buried on site	✓			
Recyclables removed by licensed Contractors	✓	By council and local contractors		M.M.
Putrescible waste covered and regularly removed	✓	By council contractors		M.M.

EXTRACTION PROGRAM				
Extraction depths from monthly checked control points in accordance with extraction program.	✓			
ROADS AND TRANSPORT				
Weekly inspection of Old Northern Rd/Crown Rd intersection and sand/clay removed as necessary.	✓			
Crown Road, Old Northern Road near site, intersection & haul roads in good state of repair.	✓			
Truck movements have not exceeded 180/day, or 40 between 6-7am.	✓	Refer to truck records		M.M.
Weighbridge/log book records forwarded to Council monthly	✓	Refer to S. 94		M.M.
REPORTING				
Complaints register maintained	✓	updated monthly		M.M.
Environmental incidents reported to EPA and DPIE	✓	None this period		M.M.
PIRMP / SPILL KIT				
Spill kits inspected and used items replaced	✓			
A copy of PIRMP flowchart available in each Spill Kit	✓			

Signed: M. Mast ..... (Environmental Officer or Delegate)

Appendix F – Truck Movement Data

Example Daily Truck Record

Mth Nov **Day** 12 **2019**

Todays Total	1845	Monthly Total	33,619	Total No of Trans	7	Total Trans Tonnage	249

	Product amount														
Tot	**732**	**88**	**318**	**121**	**19**	**103**	**-**	**-**	**123**	**-**	**38**	**-**	**-**	**-**	
No	**White**	**Yellow**	**Coarse**	**Fine**	**Bunker**	**Parklea**	**Prop**	**USGA**	**Soil Blds**	**RaceTrk**	**Dog Trk**	**Sports**	**M165**	**Trans**	**Transfers**
1	39.04														
2	32.24														
3	19.36														
4			39.76												35.5
5	37.24														
6	26.18														
7	37.78														
8						39.16									
9	39.16														
10	12.18	19.84													
11						31.40									
12					19.06										
13	32.56														
14				19.32											
15	38.52														
16	14.04														
17			20.26	12.76											
18			39.76												35.5
19	37.52														
20	10.60														
21	13.10														
22	26.06														
23	32.34														
24			39.64												35.5
25	28.70														
26		14.66													
27						32.02									
28	20.94														
29	13.50														
30	12.68														
31	19.88														
32			39.46												35.5
33	38.80														
34											37.76				
35									32.04						
36									14.38						
37	32.54														
38		15.08													
39	26.12														
40	37.98														
41				39.00											
42			39.70												35.5
43			19.96	12.70											
44				37.38											
45	13.46														
46									37.64						
47			39.54												35.5
48		38.88													
49	39.04														
50			39.66												35.5
51									38.50						

Example Daily Transfer from Haerses Road to Old Northern Road

TRANSFERS

NOV 2020			Tonnes/Mth	6,638.50	
			Number/Mth	187	
Date	**AM/PM**	**Arrival Time**	**Dispatch Time**	**Tonnes**	**No Trks/day**
02-Nov-20	AM	6.12	6.17	35.50	
02-Nov-20	AM	8.01	8.06	35.50	
02-Nov-20	AM	8.05	8.10	35.50	
02-Nov-20	AM	9.38	9.43	35.50	
02-Nov-20	AM	11.14	11.19	35.50	
02-Nov-20	PM	1.11	1.16	35.50	
02-Nov-20	PM	2.04	2.09	35.50	
02-Nov-20	PM	2.54	2.59	35.50	**8**
03-Nov-20	AM	6.11	6.16	35.50	
03-Nov-20	AM	8.02	8.07	35.50	
03-Nov-20	AM	9.49	9.54	35.50	
03-Nov-20	AM	11.39	11.44	35.50	
03-Nov-20	PM	1.14	1.19	35.50	
03-Nov-20	PM	2.51	2.56	35.50	
03-Nov-20	PM	4.32	4.37	35.50	**7**
04-Nov-20	AM	6.10	6.15	35.50	
04-Nov-20	AM	8.00	8.05	35.50	
04-Nov-20	AM	9.46	9.51	35.50	
04-Nov-20	AM	11.25	11.30	35.50	
04-Nov-20	PM	1.08	1.13	35.50	
04-Nov-20	PM	2.53	2.58	35.50	
04-Nov-20	PM	4.40	4.45	35.50	**7**
05-Nov-20	AM	6.03	6.08	35.50	
05-Nov-20	AM	8.06	8.11	35.50	
05-Nov-20	AM	10.00	10.05	35.50	
05-Nov-20	AM	10.20	10.25	35.50	
05-Nov-20	AM	11.51	11.56	35.50	**5**
06-Nov-20	AM	6.12	6.17	35.50	
06-Nov-20	AM	7.58	8.03	35.50	
06-Nov-20	AM	9.58	10.03	35.50	
06-Nov-20	AM	11.39	11.44	35.50	
06-Nov-20	PM	1.23	1.28	35.50	**5**
09-Nov-20	AM	6.14	6.19	35.50	
09-Nov-20	AM	7.58	8.03	35.50	
09-Nov-20	AM	8.07	8.12	35.50	
09-Nov-20	AM	9.44	9.49	35.50	
09-Nov-20	AM	11.21	11.26	35.50	
09-Nov-20	AM	11.48	11.53	35.50	
09-Nov-20	PM	1.01	1.06	35.50	
09-Nov-20	PM	3.06	3.11	35.50	
09-Nov-20	PM	4.40	4.45	35.50	**9**
10-Nov-20	AM	6.11	6.16	35.50	
10-Nov-20	AM	7.50	7.55	35.50	

10-Nov-20	AM	9.50	9.55	35.50	
10-Nov-20	AM	11.30	11.35	35.50	
10-Nov-20	PM	1.17	1.22	35.50	
10-Nov-20	PM	3.06	3.11	35.50	
10-Nov-20	PM	4.43	4.48	35.50	**7**
11-Nov-20	AM	6.00	6.05	35.50	
11-Nov-20	AM	6.05	6.10	35.50	
11-Nov-20	AM	6.14	6.19	35.50	
11-Nov-20	AM	7.26	7.31	35.50	
11-Nov-20	AM	7.38	7.43	35.50	
11-Nov-20	AM	8.22	8.27	35.50	
11-Nov-20	AM	8.56	9.01	35.50	
11-Nov-20	AM	9.27	9.32	35.50	
11-Nov-20	AM	10.24	10.29	35.50	
11-Nov-20	AM	11.14	11.19	35.50	
11-Nov-20	PM	1.57	2.02	35.50	
11-Nov-20	PM	3.08	3.13	35.50	
11-Nov-20	PM	3.46	3.51	35.50	**13**
12-Nov-20	AM	6.04	6.09	35.50	
12-Nov-20	AM	7.53	7.58	35.50	
12-Nov-20	AM	9.49	9.54	35.50	
12-Nov-20	AM	11.35	11.40	35.50	
12-Nov-20	PM	1.07	1.12	35.50	
12-Nov-20	PM	3.15	3.20	35.50	
12-Nov-20	PM	4.50	4.55	35.50	**7**
13-Nov-20	AM	6.07	6.12	35.50	
13-Nov-20	AM	8.01	8.06	35.50	
13-Nov-20	AM	9.43	9.48	35.50	
13-Nov-20	AM	11.27	11.32	35.50	
13-Nov-20	AM	11.34	11.39	35.50	
13-Nov-20	PM	1.02	1.07	35.50	
13-Nov-20	PM	1.24	1.29	35.50	
13-Nov-20	PM	3.05	3.10	35.50	
13-Nov-20	PM	3.12	3.17	35.50	
13-Nov-20	PM	4.45	4.50	35.50	
13-Nov-20	PM	4.54	4.59	35.50	**11**
14-Nov-20	AM	6.33	6.38	35.50	
14-Nov-20	AM	8.12	8.17	35.50	
14-Nov-20	AM	9.45	9.50	35.50	
14-Nov-20	AM	11.39	11.44	35.50	**4**
16-Nov-20	AM	6.03	6.08	35.50	
16-Nov-20	AM	7.50	7.55	35.50	
16-Nov-20	AM	9.46	9.51	35.50	
16-Nov-20	AM	11.23	11.28	35.50	
16-Nov-20	AM	11.47	11.52	35.50	
16-Nov-20	PM	1.15	1.20	35.50	
16-Nov-20	PM	3.14	3.19	35.50	
16-Nov-20	PM	3.21	3.26	35.50	
16-Nov-20	PM	4.56	5.01	35.50	**9**
17-Nov-20	AM	6.02	6.07	35.50	

17-Nov-20	AM	7.39	7.44	35.50	
17-Nov-20	AM	9.30	9.35	35.50	
17-Nov-20	AM	11.04	11.09	35.50	
17-Nov-20	PM	1.00	1.05	35.50	
17-Nov-20	PM	2.42	2.47	35.50	
17-Nov-20	PM	3.31	3.36	35.50	
17-Nov-20	PM	4.22	4.27	35.50	**8**
18-Nov-20	AM	6.04	6.09	35.50	
18-Nov-20	AM	7.57	8.02	35.50	
18-Nov-20	AM	9.46	9.51	35.50	
18-Nov-20	AM	11.27	11.32	35.50	
18-Nov-20	PM	1.28	1.33	35.50	
18-Nov-20	PM	3.31	3.36	35.50	
18-Nov-20	PM	3.58	4.03	35.50	**7**
19-Nov-20	AM	6.14	6.19	35.50	
19-Nov-20	AM	7.52	7.57	35.50	
19-Nov-20	AM	8.00	8.05	35.50	
19-Nov-20	AM	9.41	9.46	35.50	
19-Nov-20	AM	10.04	10.09	35.50	
19-Nov-20	AM	11.29	11.34	35.50	
19-Nov-20	PM	12.24	12.29	35.50	
19-Nov-20	PM	1.05	1.10	35.50	
19-Nov-20	PM	1.51	1.56	35.50	
19-Nov-20	PM	2.42	2.47	35.50	
19-Nov-20	PM	3.25	3.30	35.50	
19-Nov-20	PM	4.22	4.27	35.50	**12**
20-Nov-20	AM	6.12	6.17	35.50	
20-Nov-20	AM	7.53	7.58	35.50	
20-Nov-20	AM	9.40	9.45	35.50	
20-Nov-20	AM	9.47	9.52	35.50	
20-Nov-20	AM	11.14	11.19	35.50	
20-Nov-20	AM	11.33	11.38	35.50	
20-Nov-20	PM	12.41	12.46	35.50	
20-Nov-20	PM	1.10	1.15	35.50	
20-Nov-20	PM	2.17	2.22	35.50	
20-Nov-20	PM	2.45	2.50	35.50	
20-Nov-20	PM	3.55	4.00	35.50	
20-Nov-20	PM	4.30	4.35	35.50	**12**
21-Nov-20	AM	6.05	6.10	35.50	
21-Nov-20	AM	7.40	7.45	35.50	
21-Nov-20	AM	9.27	9.32	35.50	
21-Nov-20	AM	11.04	11.09	35.50	**4**
23-Nov-20	AM	6.04	6.09	35.50	
23-Nov-20	AM	7.49	7.54	35.50	
23-Nov-20	AM	9.37	9.42	35.50	
23-Nov-20	AM	11.47	11.52	35.50	
23-Nov-20	PM	2.07	2.12	35.50	**5**
24-Nov-20	AM	6.04	6.09	35.50	
24-Nov-20	AM	8.06	8.11	35.50	
24-Nov-20	AM	9.52	9.57	35.50	

24-Nov-20	AM	10.02	10.07	35.50	
24-Nov-20	AM	11.50	11.55	35.50	
24-Nov-20	PM	2.09	2.14	35.50	
24-Nov-20	PM	3.50	3.55	35.50	**7**
25-Nov-20	AM	6.06	6.11	35.50	
25-Nov-20	AM	7.54	7.59	35.50	
25-Nov-20	AM	9.39	9.44	35.50	
25-Nov-20	AM	11.41	11.46	35.50	
25-Nov-20	PM	1.18	1.23	35.50	
25-Nov-20	PM	3.14	3.19	35.50	**6**
26-Nov-20	AM	6.09	6.14	35.50	
26-Nov-20	AM	6.33	6.38	35.50	
26-Nov-20	AM	8.01	8.06	35.50	
26-Nov-20	AM	10.00	10.05	35.50	
26-Nov-20	AM	10.06	10.11	35.50	
26-Nov-20	AM	10.20	10.25	35.50	
26-Nov-20	AM	11.16	11.21	35.50	
26-Nov-20	AM	11.53	11.58	35.50	
26-Nov-20	PM	12.00	12.05	35.50	
26-Nov-20	PM	12.32	12.37	35.50	
26-Nov-20	PM	1.14	1.19	35.50	
26-Nov-20	PM	2.00	2.05	35.50	
26-Nov-20	PM	2.06	2.11	35.50	
26-Nov-20	PM	3.48	3.53	35.50	**14**
27-Nov-20	AM	6.10	6.15	35.50	
27-Nov-20	AM	7.39	7.44	35.50	
27-Nov-20	AM	9.04	9.09	35.50	
27-Nov-20	AM	10.49	10.54	35.50	
27-Nov-20	PM	12.34	12.39	35.50	
27-Nov-20	PM	2.31	2.36	35.50	
27-Nov-20	PM	4.13	4.18	35.50	**7**
28-Nov-20	AM	6.23	6.28	35.50	
28-Nov-20	AM	8.04	8.09	35.50	
28-Nov-20	AM	9.37	9.42	35.50	
28-Nov-20	AM	11.23	11.28	35.50	**4**
30-Nov-20	AM	6.09	6.14	35.50	
30-Nov-20	AM	6.48	6.53	35.50	
30-Nov-20	AM	7.15	7.20	35.50	
30-Nov-20	AM	9.54	9.59	35.50	
30-Nov-20	AM	10.15	10.20	35.50	
30-Nov-20	AM	11.37	11.42	35.50	
30-Nov-20	PM	1.19	1.24	35.50	
30-Nov-20	PM	3.09	3.14	35.50	
30-Nov-20	PM	4.50	4.55	35.50	**9**

Example Morning Truck Record between 6:00 - 7:00 am

Dixon Sand - Maroota Quarry Morning Trucks

Jan 2021 6.00am - 7.00am

Date	Time in	Docket No.	Tonnes	No Trks/day
4/01/2021	6.00am	293311	12.90	
4/01/2021	6.01am	293312	19.86	
4/01/2021	6.11am	293313	38.64	
4/01/2021	6.29am	293314	17.14	
4/01/2021	6.39am	293315	37.98	5
5/01/2021	6.00am	293349	19.38	
5/01/2021	6.04am	293350	38.96	
5/01/2021	6.12am	293351	37.06	
5/01/2021	6.18am	293352	20.02	
5/01/2021	6.20am	293353	12.68	
5/01/2021	6.24am	293354	19.74	
5/01/2021	6.35am	293355	38.28	
5/01/2021	6.37am	293356	14.00	
5/01/2021	6.38am	293357	19.58	
5/01/2021	6.42am	293358	15.94	
5/01/2021	6.50am	293359	37.44	
5/01/2021	6.58am	293360	16.74	12
6/01/2021	6.00am	293417	19.46	
6/01/2021	6.01am	293418	38.00	
6/01/2021	6.02am	293419	20.02	
6/01/2021	6.03am	293420	12.34	
6/01/2021	6.04am	293421	19.44	
6/01/2021	6.05am	293422	19.48	
6/01/2021	6.06am	293423	15.08	
6/01/2021	6.08am	293424	17.18	
6/01/2021	6.10am	293425	37.70	
6/01/2021	6.12am	293426	18.68	
6/01/2021	6.16am	293427	16.26	
6/01/2021	6.17am	293428	17.82	
6/01/2021	6.20am	293429	17.96	
6/01/2021	6.25am	293430	19.32	
6/01/2021	6.26am	293431	20.04	
6/01/2021	6.52am	293432	16.92	16
7/01/2021	6.00am	293474	19.66	
7/01/2021	6.01am	293475	20.04	
7/01/2021	6.02am	293476	38.56	
7/01/2021	6.03am	293477	12.64	
7/01/2021	6.04am	293478	19.36	
7/01/2021	6.05am	293479	17.02	
7/01/2021	6.07am	293480	19.02	
7/01/2021	6.10am	293481	30.20	
7/01/2021	6.12am	293482	20.04	
7/01/2021	6.14am	293483	14.42	
7/01/2021	6.17am	293484	18.32	
7/01/2021	6.21am	293485	18.50	
7/01/2021	6.30am	293486	38.14	
7/01/2021	6.44am	293487	19.82	
7/01/2021	6.47am	293488	17.64	
7/01/2021	6.58am	293489	17.10	16
8/01/2021	6.00am	293533	20.22	
8/01/2021	6.01am	293534	16.70	
8/01/2021	6.02am	293535	12.58	

Dixon Sand - Maroota Quarry Morning Trucks

8/01/2021	6.03am	293536	19.94	
8/01/2021	6.05am	293537	19.56	
8/01/2021	6.06am	293538	38.84	
8/01/2021	6.08am	293539	15.12	
8/01/2021	6.09am	293540	19.38	
8/01/2021	6.12am	293541	19.66	
8/01/2021	6.14am	293542	17.18	
8/01/2021	6.15am	293543	20.00	
8/01/2021	6.19am	293544	19.30	
8/01/2021	6.21am	293545	18.44	
8/01/2021	6.25am	293546	14.28	
8/01/2021	6.31am	293547	18.28	
8/01/2021	6.34am	293548	17.90	
8/01/2021	6.36am	293549	17.12	
8/01/2021	6.41am	293550	20.32	18
9/01/2021	6.01am	293613	39.76	
9/01/2021	6.37am	293614	37.94	2
11/01/2021	6.00am	293621	19.60	
11/01/2021	6.01am	293622	20.00	
11/01/2021	6.02am	293623	20.02	
11/01/2021	6.03am	293624	32.76	
11/01/2021	6.06am	293625	37.90	
11/01/2021	6.07am	293626	19.90	
11/01/2021	6.12am	293627	37.42	
11/01/2021	6.14am	293628	12.72	
11/01/2021	6.15am	293629	19.48	
11/01/2021	6.16am	293630	19.46	
11/01/2021	6.19am	293631	18.92	
11/01/2021	6.23am	293632	38.96	
11/01/2021	6.28am	293633	18.94	
11/01/2021	6.30am	293634	27.92	
11/01/2021	6.31am	293635	20.04	
11/01/2021	6.37am	293636	19.42	
11/01/2021	6.40am	293637	19.44	
11/01/2021	6.42am	293638	39.76	
11/01/2021	6.44am	293639	31.58	
11/01/2021	6.48am	293640	17.68	20
12/01/2021	6.00am	293741	20.06	
12/01/2021	6.01am	293742	38.02	
12/01/2021	6.02am	293743	38.04	
12/01/2021	6.03am	293744	20.08	
12/01/2021	6.05am	293745	31.50	
12/01/2021	6.06am	293746	11.72	
12/01/2021	6.08am	293747	12.52	
12/01/2021	6.09am	293748	19.96	
12/01/2021	6.10am	293749	19.20	
12/01/2021	6.12am	293750	19.44	
12/01/2021	6.17am	293751	19.00	
12/01/2021	6.19am	293752	39.70	
12/01/2021	6.24am	293753	31.86	
12/01/2021	6.25am	293754	37.34	
12/01/2021	6.28am	293755	18.12	
12/01/2021	6.29am	293756	28.54	
12/01/2021	6.34am	293757	20.28	
12/01/2021	6.37am	293758	38.38	

Dixon Sand - Maroota Quarry Morning Trucks

12/01/2021	6.41am	293759	20.14	
12/01/2021	6.47am	293760	19.40	20
13/01/2021	6.00am	293835	37.68	
13/01/2021	6.01am	293836	32.54	
13/01/2021	6.02am	293837	19.30	
13/01/2021	6.04am	293838	19.52	
13/01/2021	6.08am	293839	19.36	
13/01/2021	6.09am	293840	39.76	
13/01/2021	6.11am	293841	19.00	
13/01/2021	6.12am	293842	12.84	
13/01/2021	6.15am	293843	37.18	
13/01/2021	6.16am	293844	37.14	
13/01/2021	6.20am	293845	28.36	
13/01/2021	6.21am	293846	19.64	
13/01/2021	6.25am	293847	16.54	
13/01/2021	6.28am	293848	37.20	
13/01/2021	6.31am	293849	18.22	
13/01/2021	6.33am	293850	38.34	
13/01/2021	6.36am	293851	17.90	
13/01/2021	6.39am	293852	38.28	
13/01/2021	6.58am	293853	32.40	19
14/01/2021	6.00am	293927	37.44	
14/01/2021	6.01am	293928	20.06	
14/01/2021	6.02am	293929	16.88	
14/01/2021	6.06am	293930	38.64	
14/01/2021	6.08am	293931	19.88	
14/01/2021	6.12am	293932	38.84	
14/01/2021	6.17am	293933	32.72	
14/01/2021	6.19am	293934	32.78	
14/01/2021	6.20am	293935	12.70	
14/01/2021	6.24am	293936	19.22	
14/01/2021	6.25am	293937	39.74	
14/01/2021	6.31am	293938 & 293939	38.68	
14/01/2021	6.33am	293939	32.32	
14/01/2021	6.37am	293940	31.76	
14/01/2021	6.39am	293941	38.10	
14/01/2021	6.47am	293942	6.80	
14/01/2021	6.50am	293943	38.48	17
15/01/2021	6.00am	294004	16.46	
15/01/2021	6.01am	294005	19.44	
15/01/2021	6.02am	294006	12.48	
15/01/2021	6.03am	294007	32.60	
15/01/2021	6.04am	294008	39.76	
15/01/2021	6.09am	294009	39.58	
15/01/2021	6.11am	294010	37.44	
15/01/2021	6.12am	294011	28.44	
15/01/2021	6.18am	294012	38.36	
15/01/2021	6.23am	294013	20.10	
15/01/2021	6.35am	294014	38.56	
15/01/2021	6.39am	294015	31.84	
15/01/2021	6.42am	294016	12.64	
15/01/2021	6.44am	294017	13.60	
15/01/2021	6.53am	294018	42.18	
15/01/2021	6.56am	294019	17.34	16
16/01/2021	6.08am	2940090	39.70	

Dixon Sand - Maroota Quarry Morning Trucks

16/01/2021	6.14am	2940091	19.44	
16/01/2021	6.17am	2940092	20.10	
16/01/2021	6.19am	2940093	16.54	
16/01/2021	6.24am	2940094	28.64	
16/01/2021	6.33am	2940095	38.32	
16/01/2021	6.40am	2940096	30.14	
16/01/2021	6.49am	2940097	38.60	8
18/01/2021	6.00am	294113	20.00	
18/01/2021	6.01am	294114	39.04	
18/01/2021	6.02am	294115	12.72	
18/01/2021	6.03am	294116	19.78	
18/01/2021	6.04am	294117	32.26	
18/01/2021	6.11am	294118	39.66	
18/01/2021	6.12am	294119	38.12	
18/01/2021	6.14am	294120	14.00	
18/01/2021	6.18am	294121	36.94	
18/01/2021	6.21am	294122	19.44	
18/01/2021	6.25am	294123	31.90	
18/01/2021	6.31am	294124	28.44	
18/01/2021	6.37am	294125	38.46	
18/01/2021	6.51am	294126	32.30	14
19/01/2021	6.00am	294171	19.84	
19/01/2021	6.01am	294172	12.62	
19/01/2021	6.02am	294173	38.26	
19/01/2021	6.03am	294174	32.26	
19/01/2021	6.04am	294175	39.50	
19/01/2021	6.10am	294176	19.00	
19/01/2021	6.11am	294177	37.04	
19/01/2021	6.14am	294178	37.18	
19/01/2021	6.16am	294179	28.28	
19/01/2021	6.21am	294180	20.08	
19/01/2021	6.29am	294181	38.28	
19/01/2021	6.44am	294182	31.62	
19/01/2021	6.46am	294183	8.54	13
20/01/2021	6.00am	294219	38.76	
20/01/2021	6.01am	294220	12.64	
20/01/2021	6.02am	294221	19.98	
20/01/2021	6.03am	294222	32.14	
20/01/2021	6.05am	294223	39.76	
20/01/2021	6.10am	294224 & 294225	31.50	
20/01/2021	6.12am	294226	18.02	
20/01/2021	6.19am	294227	31.96	
20/01/2021	6.45am	294228	28.58	
20/01/2021	6.21am	294229	39.38	10
21/01/2021	6.00am	294271	19.82	
21/01/2021	6.01am	294272	32.34	
21/01/2021	6.02am	294273	12.34	
21/01/2021	6.03am	294274	39.54	
21/01/2021	6.05am	294275	37.30	
21/01/2021	6.09am	294276	37.66	
21/01/2021	6.12am	294277	37.90	
21/01/2021	6.14am	294278	18.90	
21/01/2021	6.21am	294279	30.42	
21/01/2021	6.24am	294280	38.08	
21/01/2021	6.28am	294281	39.06	

Dixon Sand - Maroota Quarry Morning Trucks

21/01/2021	6.33am	294282	28.64	
21/01/2021	6.40am	294283	14.36	
21/01/2021	6.58am	294284	32.86	14
22/01/2021	6.00am	294333	12.52	
22/01/2021	6.01am	294334	19.70	
22/01/2021	6.02am	294335	32.36	
22/01/2021	6.03am	294336	18.86	
22/01/2021	6.04am	294337	31.20	
22/01/2021	6.06am	294338	39.76	
22/01/2021	6.15am	294339	38.94	
22/01/2021	6.19am	294340	28.68	
22/01/2021	6.25am	294341	38.54	
22/01/2021	6.52am	294342	39.04	10
23/01/2021	6.00am	294374	38.76	
23/01/2021	6.05am	294375	32.42	
23/01/2021	6.14am	294376	39.68	3
25/01/2021	6.00am	294386	39.04	
25/01/2021	6.03am	294387	38.60	
25/01/2021	6.08am	294388	19.84	
25/01/2021	6.15am	294389	32.72	
25/01/2021	6.21am	294390	39.56	
25/01/2021	6.25am	294391	28.52	
25/01/2021	6.29am	294392	17.00	
25/01/2021	6.34am	294393	19.92	
25/01/2021	6.54am	294394	39.00	9
27/01/2021	6.00am	294420	19.74	
27/01/2021	6.01am	294421	16.50	
27/01/2021	6.02am	294422	39.04	
27/01/2021	6.03am	294423	12.60	
27/01/2021	6.05am	294424	16.42	
27/01/2021	6.06am	294425	37.94	
27/01/2021	6.07am	294426	19.30	
27/01/2021	6.09am	294427	19.22	
27/01/2021	6.10am	294428	14.96	
27/01/2021	6.12am	294429	36.80	
27/01/2021	6.17am	294430 & 294431	31.90	
27/01/2021	6.20am	294432	17.72	
27/01/2021	6.21am	294433	36.88	
27/01/2021	6.36am	294434	28.58	14
28/01/2021	6.00am	294470	39.04	
28/01/2021	6.01am	294471	38.86	
28/01/2021	6.02am	294472	12.42	
28/01/2021	6.05am	294473	19.84	
28/01/2021	6.07am	294474	32.32	
28/01/2021	6.14am	294475 & 294476	37.90	
28/01/2021	6.19am	294477	31.90	
28/01/2021	6.23am	294478	39.76	
28/01/2021	6.26am	294479	38.80	
28/01/2021	6.30am	294480	20.28	
28/01/2021	6.34am	294481	17.18	
28/01/2021	6.49am	294482	6.48	
28/01/2021	6.50am	294483	32.66	13
29/01/2021	6.00am	294515	40.00	
29/01/2021	6.01am	294516	38.94	
29/01/2021	6.03am	294517	19.14	

Dixon Sand - Maroota Quarry Morning Trucks				
29/01/2021	6.10am	294518	32.48	
29/01/2021	6.15am	294519	38.56	
29/01/2021	6.21am	294520	37.20	
29/01/2021	6.27am	294521	38.24	
29/01/2021	6.32am	294522	16.94	
29/01/2021	6.40am	294523 & 294524	38.66	
29/01/2021	6.47am	294525	28.56	10
30/01/2021	6.00am	294556	31.76	1
		TOTALS	**7,426.48**	**280**
				Max Daily Morning Truck (laden)
				20

Appendix G – Bush Regeneration Report

Bush-it
Your Bushland...Our Passion

Dixon Sand Pty Ltd

Old Northern Road Quarry

(Development Consent DA 250-09-01)



Annual Report

July 2020 – June 2021

Assisted bush regeneration and rehabilitation works

Authors: Jeff Gibbs & Zoe Ridgway

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INTRODUCTION

This report summarises the assisted bush regeneration work undertaken by Bush-it Pty Ltd for Dixon Sand Pty Ltd between July 2020 and June 2021 as part of the Old Northern Development Consent DA 250-09-01.
A total of 492.5 hours ($27,353.45 excluding GST) were worked throughout the year with an average team size of four per visit. The distribution of hours over the financial year are not uniform, as resources are focused on undertaking primary/planting works in the cooler months and targeting exotic grasses from seeding and spreading at the tail end of summer. Forecasted hours are shown below in Figure 1.

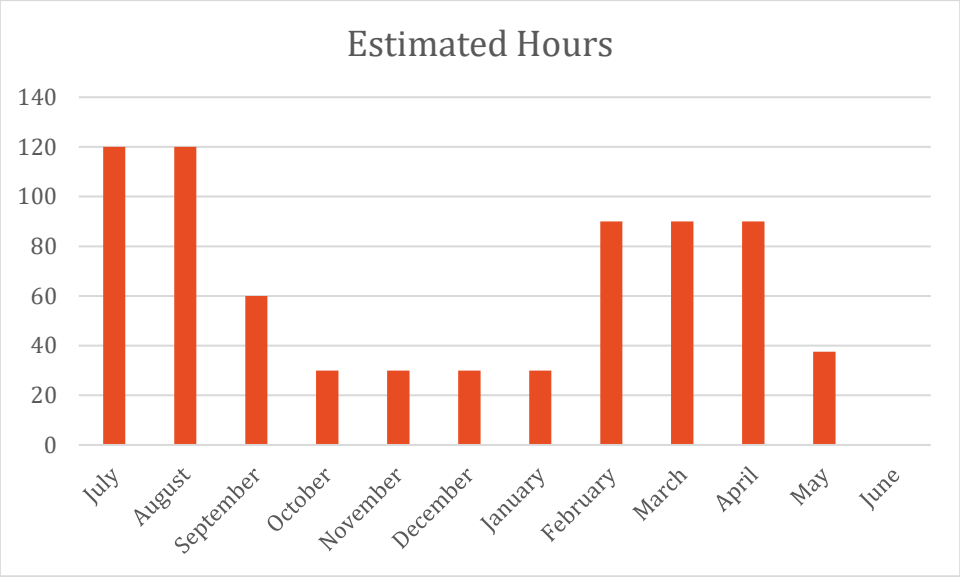


Figure 1 – Forecast of resources over the financial year showing a bimodal distribution.

Dixon Sand Pty Ltd operate a mineral sand quarry on the Old Northern Road at Maroota, NSW. On their behalf Bush-it manages the native vegetation of roughly 8.4 hectares at the Old Northern Road (ONR) quarry as illustrated in Figure 2, as well as a biodiversity offset site at Haerses road quarry in Figures 4. The area managed by Bush-it at the ONR quarry is comprised of a mix of remnant native vegetation; rehabilitated quarry sand and abandoned agricultural land.

The vegetation at the ONR quarry site is managed according to the operating requirements of the mine. As the mine expands its area of extraction, existing native vegetation will be cleared, and the soil translocated to rehabilitate other areas. Figure 3 and 5 shows the different restoration activities undertaken across the entire ONR sites over the 2020-21 financial year.

In carrying out our work for Dixon Sand, Bush-it:

- Practices low impact weed management techniques such as manual removal in plant communities containing threatened species.

- Regularly identifies and maps the density and extent of weed infestations especially those covering an area of greater than 25 m^2

- Undertakes appropriate, targeted weed control activities to ensure minimum disturbance to natives and minimum off-target damage.

- Conducts site specific induction training for staff working at the mine, including field identification of all threatened species.

- Routinely assesses the effectiveness of the control programs and in response makes necessary modifications.

- We undertake monthly inspections noting the presence of weeds in drainage lines, and along access tracks.

- And we follow industry standard protocols for bushland hygiene by ensuring all our tools, boots and equipment are clean before entering the work site.

Overview of management zones and work areas

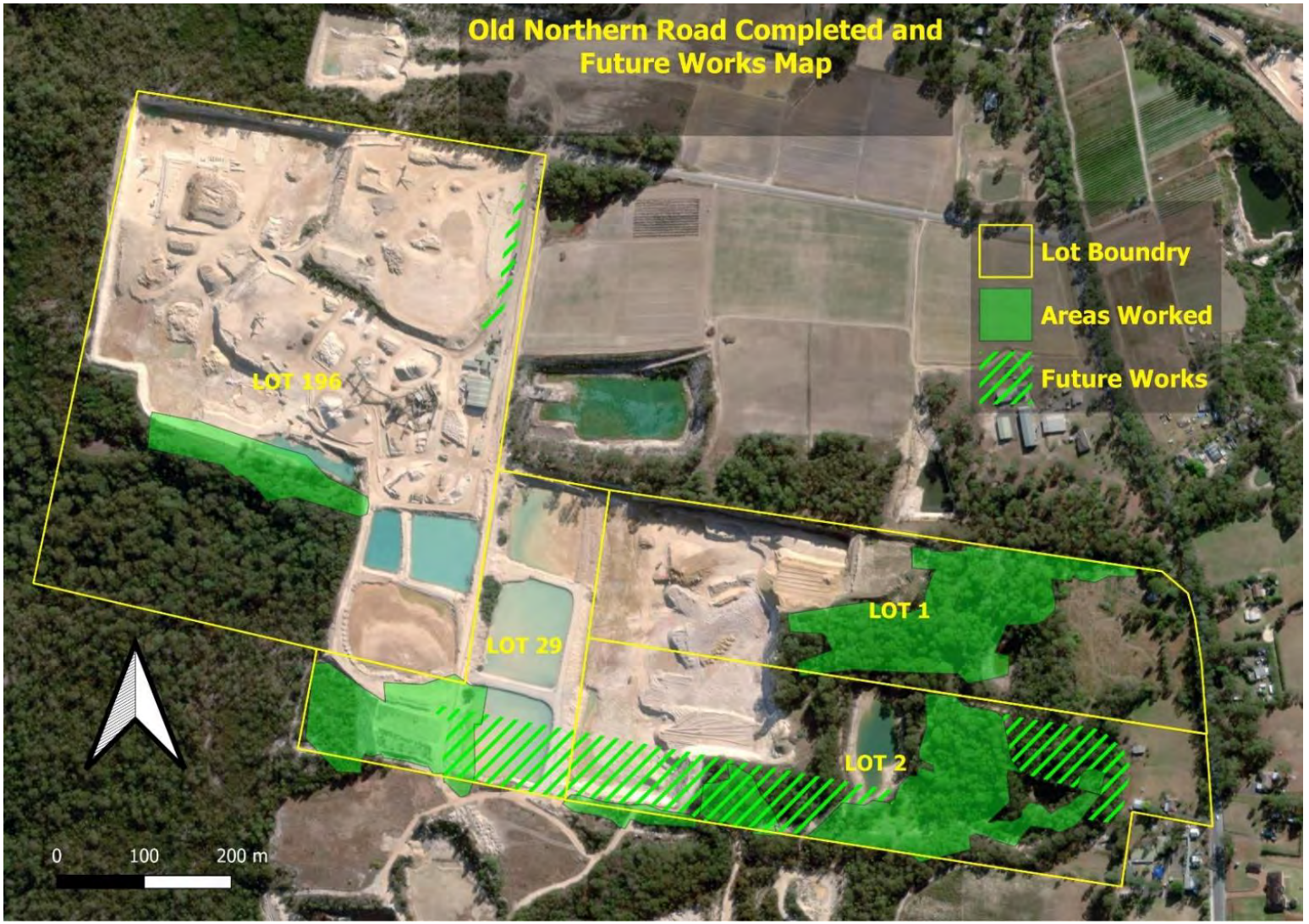


Figure 2 – Aerial photo showing the unique lots as well as the areas worked in 2020-21 and areas that will be worked in the coming years.

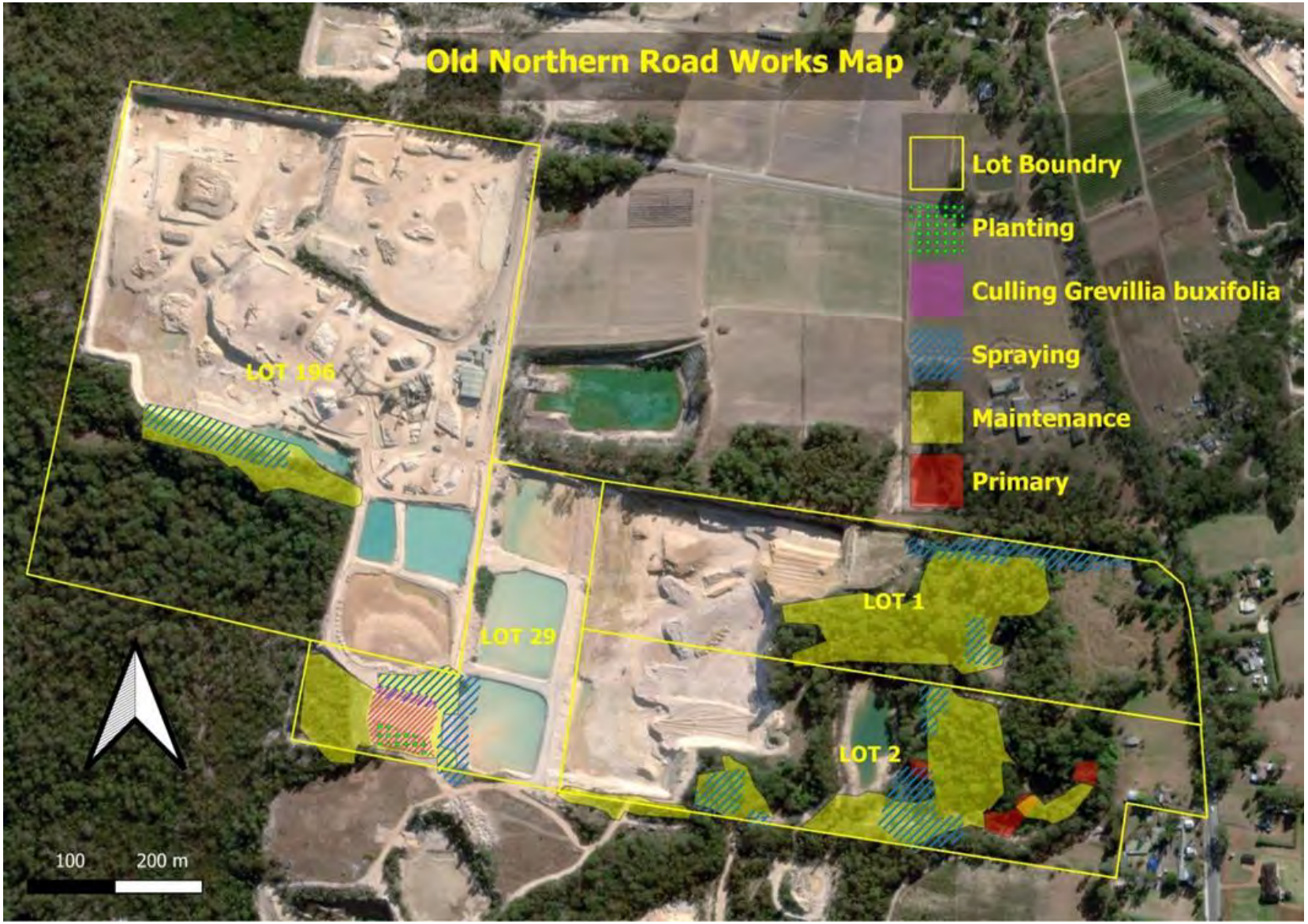


Figure 3 – Aerial photo highlighting the areas where different works activities were undertaken.

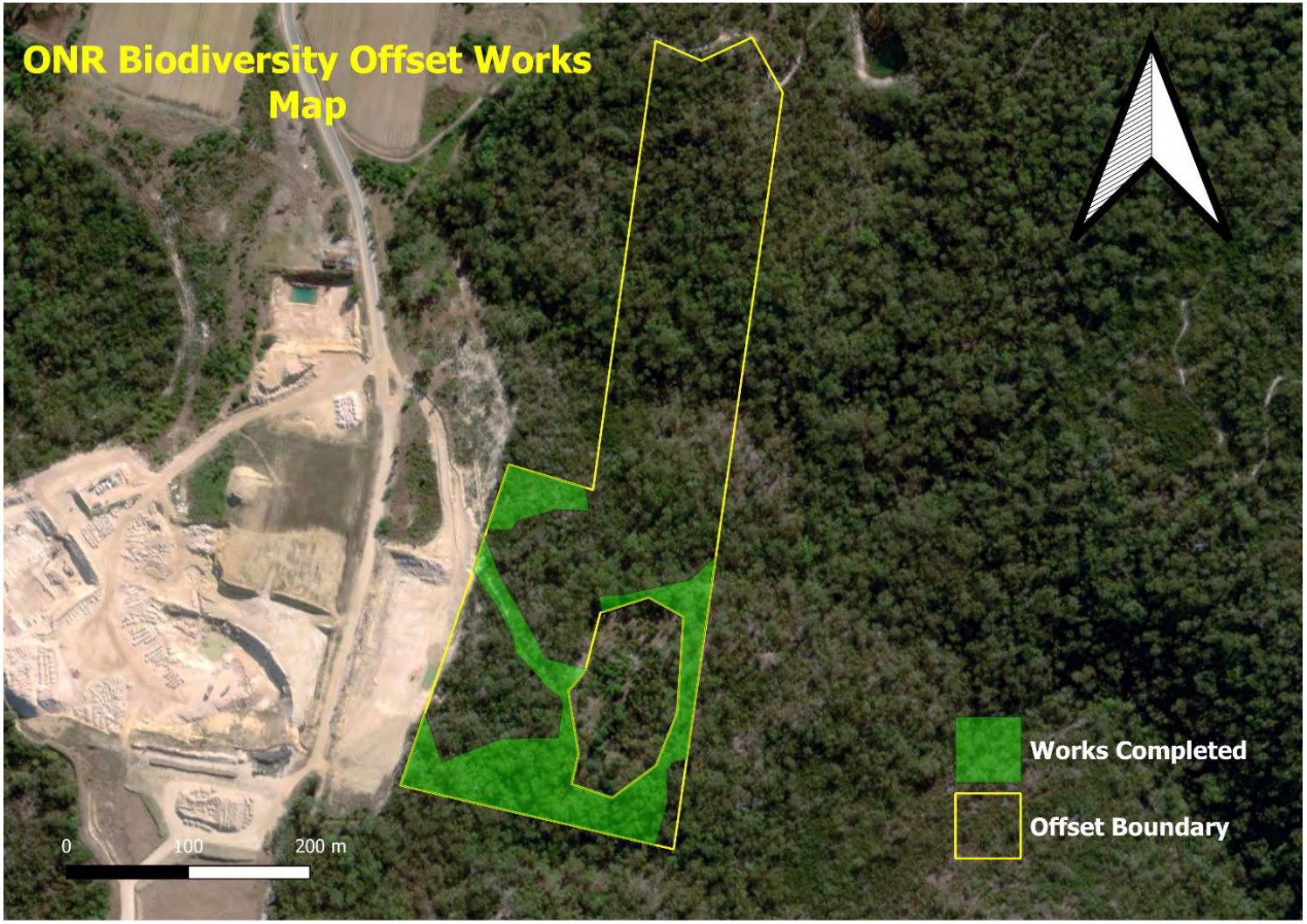


Figure 3 - Overall works conducted on the ONR biodiversity offset between 2020-2021.

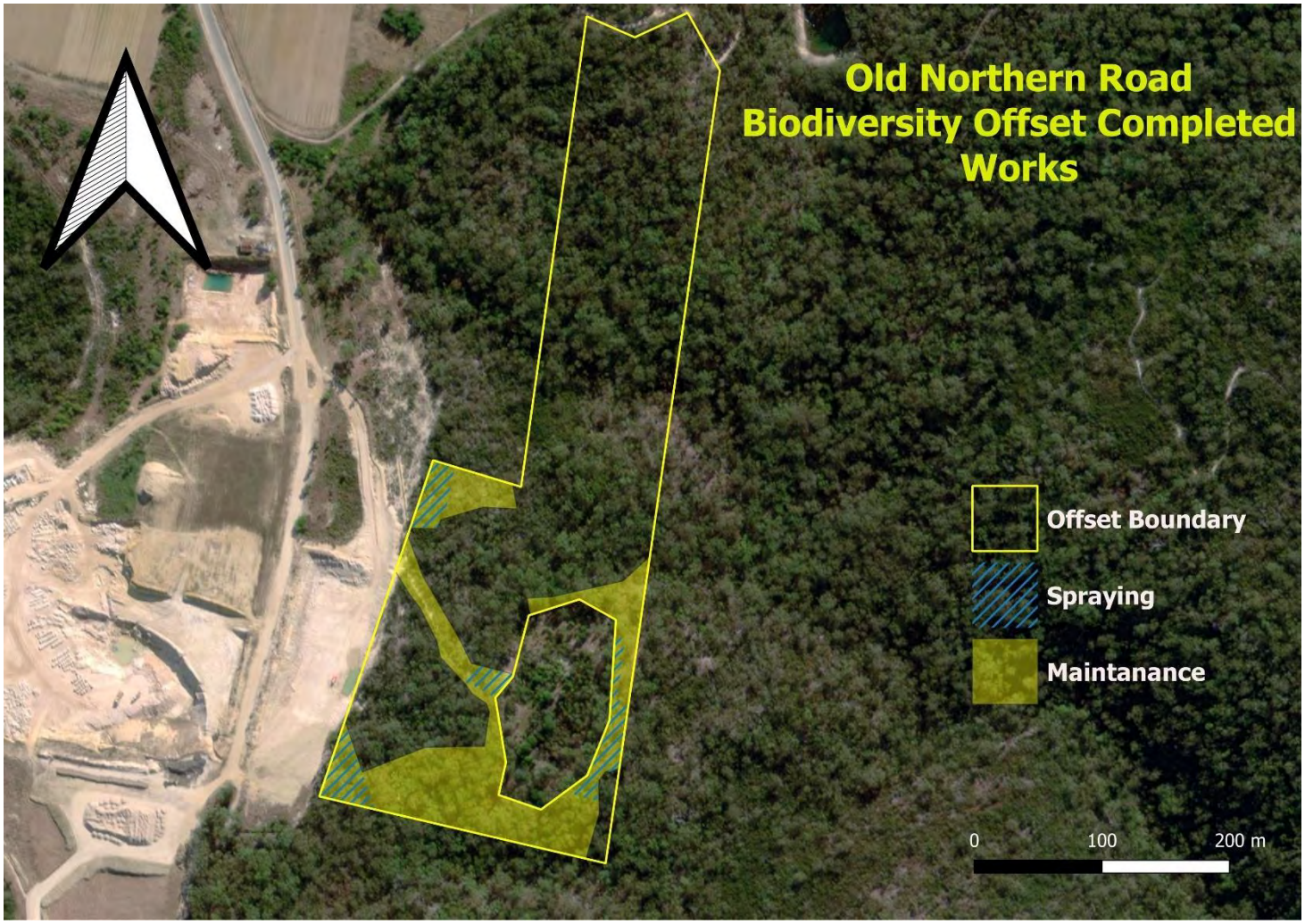


Figure 4 - Overview of the specific works conducted on the ONR biodiversity offset.

OLD NORTHERN ROAD QUARRY

EMBANKMENT AT FRONT GATE

SCOPE

The embankment at the front gate is an exposed area of the mine located between the roadway and an area used to stockpile quarry products and machinery.
The embankment is within Lot 196 are is roughly 100m long and 20 m wide. A mix of native shrubs have been planted to stabilise the soil and improve the appearance of the mound.

RESOURCES – 7 HOURS

During the last twelve months we have routinely monitored the area from the road checking for obvious infestations of exotic grass and have and treated these with herbicide and/or manually removed them. Larger thickets may occasionally need to be brush cut and spot spray exotic grasses before they set seed.

RECOMMENDATIONS

Planting remnant canopy species and competitive native groundcovers such as *Hardenbergia sp.* and *Kennedia sp*. would provide competition for exotic grasses and prevent them spreading throughout the mine.

Direct seeding of a native grasses and shrubs gathered locally may also enhance the regeneration along this edge.

LOT 1 AND 2

SCOPE

Lot 1 is a 1.4ha bush block located on the eastern side of the extraction site. It is an example of Shale-Sandstone Forest with a dry sclerophyll understorey. The canopy consists of red bloodwood (*Corymbia gummifera*) and smooth-barked apple (*Angophora costata*). There are also species here, such as the woody pear (*Xylomellum pyraform*) and the Graceful Bush Pea (*Pultenea gracilis)* that favour residual shale or laterite soils.

As Dixon Sands expands its quarry operations, Lot 1 will be cleared of vegetation and the topsoil translocated along the designated native vegetation corridor to form a connection between existing areas of bushland roughly 6.8ha in size. *Old Northern Road Quarry BRMP* (2020)

In the meantime, the vegetation on Lot 1 is conserved in its current natural state.
The work undertaken by Bush-it ensures that the biodiversity of the vegetation remains intact and free from invasive species. Bush-it also works to preserve important habitat elements on the site by minimising soil disturbance or the relocation of deadwood or other plant material.

Lot 1 is exposed to seed from exotic grasses and perennials growing on the nearby soil mounds created because of the mine expansion. *Ricinus communis* and *Phytolacca octandra* are routinely treated in this area and exotic African Love grass and Paspalum are either brush cut or sprayed.

Lot 2 is a 3.4 ha block also located on the eastern side of the excavation area. The canopy here is composed of grey gums (*Eucalyptus punctata*) and peppermint gums (*Eucalyptus piperita*) intergrading with Black she-oak (*Allocasuarina littoralis*) and *Acacia parramattensis.*

There are two water storage dams located in Lot 2 and a service trail connecting the mine and the Old Northern Road runs along the southern side.

The core areas of Lot 2 are to be conserved in their current natural state. The abandoned farm and orchards that currently harbors *Lantana camara* and various exotic grass will be steadily revegetated, and the indiscriminate clearing of vegetation by the neighbour on Lot 2 appears to have ceased so, Bush-it is now managing the degraded area and treating weeds.

The focus of our work in Lot 1 since July 2020, was to suppress the seed dispersal of exotic species from the soil mounds surrounding the site. We routinely treated *Eragrostis curvula, Paspalum urvillei* and *Andropogon virginicus* with herbicide before infestations could become established.

On the soil mounds, we also regularly cut back *Ricinus communis* and *Phytolacca octandra* before it could set seed and left the cuttings to stabilise the soil. Through the interior of Lot 1 we routinely surveyed for the emergence of bird dispersed brush weeds such as *Lantana camara* and *Ochna serulata.*

In Lot 2 we specifically targeted WONS, in particular *Asparagus asparagoides* and *Lantana camara,* as well as exotic grasses such as *Eragrostis curvula,* and *Andropogon virginicus* early in the growing season by selectively spot spraying them with herbicide (see detailed records in appendix). Around the perimeter of the site and we routinely brush cut the pathways that provide a vector for seed dispersal.

We repeatedly treated infestations of *Bidens pilosa, Targetes minuta* and *Solanum mauritianum* that emerged in Autumn after an area in Lot 2 was indiscriminately cleared with machinery and in the cooler months of this year we have resumed our work removing *Lantana camara* from the site.

In accordance with the *Old Northern Road Quarry BRMP (2020)* manual removal of *Lantana camara* has been the preferred control method and the removal of thickets has been timed to cause the least amount of disturbance to resident small bird populations, in particular where Bell Miners have colonised.

Overall, there is abundant regeneration occurring in the understorey in areas previously cleared of *Lantana camara* as shown in Figure 6 & 7. It has been a particularly good year regeneration wise, thanks to higher-than-average rainfall and less predation from herbivores.



Figure 6 – Before photo taken in July 2020 of area previously cleared



Figure 7 – After photo taken in June 2021 after small amount of follow-up work was undertaken mostly controlling small *Lantana camara* seedlings.



Figure 8 – Lantana camara being controlled using both manual and mechanical methods. Such areas require intensive follow-up to treat re-sprouting stems and seedlings.

A tall stand of *Lophostemon confertus and Eucalyptus deanei* has emerged on the eastern flank of Lot 2 and these will need to be drilled and filled and left to die in-situ.

Revegetation of the degraded areas in Lot 2 with indigenous trees and shrubs that will shade out the exotic grasses should begin as soon as practicable. This work could be further improved by translocating undisturbed soil from Lot 1 into Lot 2 with the help of machinery.

Areas of lantana should continue to be treated in Lot 2 only where there are positive signs of native regeneration as shown in Figure 8. Also consolidate dense patch of Bamboo starting from the most resilient areas, as pictured in Figure 9.



Figure 9– Large patch of Bamboo to be steadily treated in Lot 2.

SCOPE

The vegetation at Lot 196 resembles Coastal Enriched Sandstone Dry Forest intergrading with Sandstone Gully Forest containing *Angophora costata Corymbia gummifera*, *Eucalyptus piperita* with scattered *Eucalyptus haemastoma*. The understory is comprised *of Ceratapetalum gummiferum* and *Banksia serata*, and a grove of *Kunzea ambigua* has established itself on the old nursery site.

Plantings on the embankment have done little to prevent the emergence of exotic grass along this strip. Most of the maintenance hours spent here, are used to brush cut and spot spray exotic grasses before they set seed.



Figure 10 – Compacted area along the southern border of Lot 196 which requires further intervention. Photo taken in July 2020



Figure 11 – Photo taken in May after weed control works were undertaken targeting exotic grasses.



Figure 12 – Brush matting was undertaken in bare areas to promote natural regeneration

RESOURCES – 13 HOURS

Since July 2020, Bush-it has hand weeded around natives and treated infestations of *Eragrostis curvula, Paspalum urvillei* and *Andropogon virginicus* with herbicide along the embankment adjoining Lot 196. This work has been timed to coincide with the emergence of these grasses between January and April. Brush matting with *Allocasaurina littoralis* and *Leptospermum polygalifolium* was also carried out in areas where exotic grasses haven't yet established as demonstrated in Figure 12.

RECOMMENDATIONS

Bush-it recommends that a dense planting of remnant canopy species and competitive native grasses such as *Imperata cylindrica* be established along the strip adjoining Lot 196. Such a planting would provide competition for exotic grasses and prevent them spreading to into the better areas.

Likewise, the select felling of branches along the front edge of Lot 196 and there use as brush matting would also suppress exotic grass.

Direct seeding of a native grasses and shrubs gathered locally may enhance the regeneration along this edge, especially if the seed can be pre-treated.

SCOPE

The native heath in the rehabilitation area continues to flourish and the soil translocation in this area has been very successful. The locally threatened *Darwinia fascicularis subsp. oligantha* has established itself well and the *Melaleuca deanii* cuttings that were planted in 2017 have also put on new growth following above average rainfall this year.
.

RESOURCES – 157.5 HOURS

Bush-it has continued targeting whisky and pampas grass in the rehabilitation area. The proliferation of whisky and pampas on the neighbouring block owned by PF Formations P/L presents an ever-present source of wind-driven seed that blows in and establishes itself.
So, while the total eradication of pampas and whisky remains a long-term goal, we have successfully prevented any new infestations in the NVC.

Likewise, Bush-it has contained the spread of common couch, especially in the overburden piles to the North of the translocation site. We have also deseeded and sprayed the roadside grasses growing outside the fence and regular careful hand weeding throughout the translocation has prevented the spread of flat weeds.

Bush-it have taken measures to cull competitive native shrubs and trees, especially *Grevillea buxifolia*, *Allocasuarina littoralis and Banksia erificolia* to decrease the projected foliage cover, around threatened and vulnerable species. Branches were mostly scattered in bare compacted access paths where signs of regeneration are minimal as shown in Figure 15 and where erosion was evident (Figure 16).

It is anticipated this work will alleviate the competition for light and allow the threatened and vulnerable species to flourish.

Occasional scans of the rock platform heath where *Kunzea rupestris* is present were undertaken to ensure weed species do not establish. Bush-it have also undertaken direct planting of locally threatened Me*laleuca deanei*. Twenty-three tube stock seedlings where successively planted into tree guards under the supervision of Melissa Mass on the 25th of May and follow up watering has been undertaken to ensure their survival.



Figure 13 – The rock platform section where small colony of *Kunzea rupestris* is located was scanned for very occasional annual weeds and *Andropogon virginicus.*

.



Figure 14 - Selective native culling - NVC



Figure 15 – Brush matting using vegetation that was culled to decrease foliage cover



Figure 16 – Brush matting used to reduce erosion also.



Figure 17 - New *Melaleuca deanei* plantings - NVC

Continue to monitor and manage competitive native shrubs and trees in the translocation, especially where they overshadow and/or encroach on the threatened species. Bush-it will selectively cull or cut back growth to encourage the most diverse assemblage of plants possible.

Establish a buffer planting on the southern boundary that catches wind-driven seed before it reaches the site. Bush-it has regularly picked invasive grasses out of the embankment and brush cut tussocks before they can ripen but, a dense row of *Imperata cylindrica* along this fence line would be ideal.

SCOPE

The vegetation communities represented at Haerses Road Biodiversity Offset Area (HRBOA) include Sydney Sandstone Ridgetop Woodland, Sydney Sandstone Gully Forest and Sydney Sandstone Heath.

The dominant canopy species include *Corymbia gummifera* and *Eucalyptus racemosa*. While on the lower portions of the site, A*ngophora costata* and *Eucalyptus piperita* overshadow an understorey of *Syncarpia glomulifera* and *Ceratopetalum gummiferum*. The sandstone heath is prominent over the areas close to Haerses Road. The dominant species here include A*ngophora hispida, Banksia ericifolia and, Leptospermusm trinervium.*

The HRBOA is an example healthy of remnant native vegetation. It connected to an area of natural bushland and evidence suggests the trophic complexity and abundance of characteristic native species is high.

The threats to the HRBOA are well managed. On casual observation the soils on site are undisturbed and capable of supporting a diverse range of plants at various life stages. There is also evidence of colonisation of native plants around the perimeter of the HRBOA in areas that have been previously cleared of vegetation.

Given the protection it receives from the HR offset, the number of non-native invasive or undesirable species is low.

RESOURCES – 9 HOURS

In the last twelve months Bush-it has undertaken routine inspections of the HRBOA from the perimeter of the HR offset and along the drainage line that bisects the site.

These surveys have targeted known infestations of crofton weed and exotic grass and have been timed to coincide with flowering and seeding events.

By limiting the frequency and intensity of these visits, we have sought to limit the physical damage caused by trampling or inadvertent contaminating the HRBOA with invasive seed that might be carried on our clothing etc.

RECOMMENDATIONS

Continued work in the HRBOA would be assisted by identifying the successional stages of the floristic community and the habitat needs of resident fauna conducive to an ecological burn.

APPENDIX

DISTRIBUTION OF HOURS

Zone	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	TOTAL
Lot 196	0	0	0	3	0	0	0	5	5	0	0	0	**13**
Front Gate	0	0	4	0	3	0	1	0	0	0	0	0	**7**
Lots 1 & 2	26	15	55	12	11.5	0	19.5	10	19	13.5	1.5	123	**306**
NVC Lot 29	10	8	22	1.5	10	0	15	28	30	0	21	12	**157.5**
HRBOA	0	0	2	2	2	1	1	1	0	0	0	0	**9**
TOTAL	**36**	**23**	**83**	**18.5**	**26.5**	**1**	**36.5**	**44**	**54**	**13.5**	**22.5**	**135**	**492.5**

HOURS UNDERTAKING DIFFERENT ACTIVITIES ACROSS ALL SITES

ACTIVITY	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Admin	1	1	1.5	0.5	0.5	0.5	1	1.5	2	0.5	1	14	**25**
Brush Matting	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Direct Seeding	0	0	0	3	0	0	0	0	0	0	0	0	**3**
Hazard Reduction	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Maintenance	56	48.5	88	16	21.5	16	49.5	86.5	82.5	16.5	0	49	**530**
Miscellaneous	0	0	0	0	0	6.5	1.5	3.5	0	6	1.5	22.5	**41.5**
Mulching	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Planting	0	0	0	0	0	0	0	0	0	0	21	0	**21**
Primary	0	0	0	0	6	0	0	0	0	0	0	63.5	**69.5**
Secondary	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Spraying	4	11.5	2	3.5	2.5	0	1.5	0	0	0	0	0	**25**
TOTAL	**61**	**61**	**91.5**	**23**	**30.5**	**23**	**53.5**	**91.5**	**84.5**	**23**	**23.5**	**149**	**715**

WEED SPECIES CONTROLLED

Common name	**Scientific name**
Bridal Creeper	*Asparagus asparagoides*
Turkey Rhubarb	*Rumex sagittatus*
Moth vine	*Araujia sericifera*
Lantana	*Lantana camara*
Blackberry	*Rubus fruticosus agg.*
Ochna	*Ochna serrulata*
Wild Tobacco	*Solanum mauritianum*
Crofton weed	*Ageratina adenophora*
Bidens - Cobblers Peg	*Bidens pilosa*
Fleabane	*Conyza spp.*
Catsear, flatweed	*Hypochaeris radicata*
Fireweed	*Senecio madagascariensis*
Paddy's Lucerne	*Sida rhombifolia*
Blackberry Nightshade	*Solanum nigrum*
Sowthistle	*Sonchus oleraceus*
Purple Top	*Verbena bonariensis*
Panic Veldtgrass	*Ehrharta erecta*
Paspalum	*Paspalum dilatatum*
Couch common	*Cynodon dactylon*
Briza- Quaking Grass- Blowfly Grass	*Briza maxima*
Cudweed	*Gnaphalium spp.*
African Lovegrass	*Eragrostis curvula*
Buffalo Grass	*Stenotaphrum secundatum*
Flatweed	*Hypochaeris sp*
Paspalum (tussock)	*Paspalum quadrifarium*
Vetch	*Vicia spp*
Whisky grass	*Andropogon virginicus*
Summer grass	*Digitaria sanguinalis*
Periwinkle	*Vinca major*
Castor Oil	*Ricinus communis*
Stinking Roger	*Tagetes spp.*
Pigeon Grass	*Setaria spp.*
Pampas Grass	*Cortaderia selloana*
Ink weed	*Phytolacca octandra*
Chickweed	*Stellaria media*
Parramatta grass	*Sporobolus africanus*
Rhode’s grass	*Chloris gayana*
Paspalum, large	*Paspalum urvillei*
Black-eyed Susan	*Thunbergia alata*
Spear thistle	*Cirsium vulgare*
Bamboo, rhizomatous	*Phyllostachys spp*

REGISTER OF HERBICIDE RECORDS

Date	Username	Herbicide name	Wind descrip.	Direct.	Notes	Method	Qty	Vol. spray.	Start time	End time
9/07/2020	Jeff Gibbs	Round-up, Glyphosate	1 - Light Air	NE	Wind 4km/hr	Spray	150	15	10:01	12:01
20/07/2020	Joshua Freeman	Round-up, Glyphosate	1 - Light Air	NW	Sprayed love grass, annuals and whiskey grass on edge of lot 2. Wind 3km/hr	Spray	100	10	7:01	9:01
5/08/2020	Maddy Walsh	Round-up, Glyphosate	2 - Light Breeze	NE	Wind 6km/hr. Sprayed andropogon and eragrostis on edge of translocation zone.	Spray	100	10	7:01	9:01
5/08/2020	Darius Ottignon	Round-up, Glyphosate	2 - Light Breeze	NE	Wind 6km/hr. Sprayed andropogon and eragrostis on edge of translocation zone.	Spray	100	10	7:01	9:01
17/08/2020	Joshua Freeman	Round-up, Glyphosate	2 - Light Breeze	NE	Wind 5km/hr, sprayed erargrostis above bio offset area near beehives	Spray	100	10	7:01	9:01
17/08/2020	Maddy Walsh	Round-up, Glyphosate	2 - Light Breeze	NE	Wind 5km/hr, sprayed erargrostis above bio offset area near beehives	Spray	100	10	7:01	9:01
17/08/2020	Maddy Walsh	Round-up, Glyphosate	2 - Light Breeze	NE	Wind 5km/hr, spray eragrostis around translocation area	Spray	80	8	9:01	12:01
17/08/2020	Maddy Walsh	Round-up, Glyphosate	2 - Light Breeze	NE	Wind 6km/hr, spot sprayed eragrostis at raid edge of lot 1	Spray	80	8	13:01	14:01
1/09/2020	Maddy Walsh	Round-up, Glyphosate	1 - Light Air	NE	Wind 3km/hr. Sprayed invasive grasses and annuals through edges of lot 2	Spray	150	15	10:01	12:01
13/10/2020	Joshua Freeman	Round-up, Glyphosate	2 - Light Breeze	NW	Wind 4km/hr. Sprayed Crofton, thistles and whiskey grass at commander below lot 196	Spray	50	5	7:01	8:01
13/10/2020	Maddy Walsh	Other - see notes	2 - Light Breeze	NW	Wind 4km/hr. Sprayed fusilade on couch on mounds next to NVC	Spray	40	5	8:01	9:01
13/10/2020	Joshua Freeman	Starane, Fluroxypyr-meptyl	2 - Light Breeze	NW	Wind speed 6km/hr. Treated vinca in on access Rd of lot 2.	Spray	30	5	10:01	11:01
16/11/2020	Maddy Walsh	Round-up, Glyphosate	2 - Light Breeze	NW	Wind 8km/hr. Spot sprayed annuals, Crofton and any other seed spreading species on southern edge of lot 2	Spray	200	20	9:01	12:01
6/01/2021	Jeff Gibbs	Round-up, Glyphosate	2 - Light Breeze	SE	Suppress annual grasses on the road edge adjacent to the MVR overburden.	Spray	50	5	9:01	10:01
6/01/2021	Jeff Gibbs	Round-up, Glyphosate	2 - Light Breeze	SE	Containment spray for annual grasses and Bidens pilosa along the front of the Biodiversity Offset.	Spray	100	10	13:01	14:01
18/01/2021	Joshua Freeman	Round-up, Glyphosate	1 - Light Air	NW	Used to treat a flush of annuals (Bidens and Conyza) behind the Southern wall.	Spray	100	10	9:01	10:01
18/01/2021	Darius Ottignon	Round-up, Glyphosate	2 - Light Breeze	N	Used to treat a flush of annuals(Bidens and Conyza) below the holding dam.	Spray	50	5	13:01	14:01

3/02/2021	Jeff Gibbs	Round-up, Glyphosate	2 - Light Breeze		1% spray to control flowering Whiskey grass	Spray	100	10	11:01	12:01
12/02/2021	Joshua Freeman	Fusilade forte 128EC - Fluazifop-p @ 128g/L	0 - Calm	SE		Spray	30	10	7:01	14:01
22/02/2021	Joshua Freeman	Fusilade forte 128EC - Fluazifop-p @ 128g/L	2 - Light Breeze	E	Used to control Couch grass in the overburden piles	Spray	30	5	8:01	9:01
22/02/2021	Joshua Freeman	Fusilade forte 128EC - Fluazifop-p @ 128g/L	3 - Gentle Breeze	E	Used to control African love grass on the perimeter of the translocation area.	Spray	60	10	13:01	14:01
9/03/2021	Joshua Freeman	Fusilade forte 128EC - Fluazifop-p @ 128g/L	1 - Light Air	W	Used to control exotic grasses along the edge of the NVC	Spray	100	10	9:01	10:01
9/03/2021	Jeff Gibbs	Round-up, Glyphosate	1 - Light Air	W	Used to control exotic grasses and flowering annuals.	Spray	100	10	12:01	14:01
15/03/2021	Joshua Freeman	Round-up, Glyphosate	2 - Light Breeze	E	Used to control emergent annuals in the overburden piles	Spray	50	5	8:01	8:01
7/04/2021	Michael Shilman	Round-up, Glyphosate	2 - Light Breeze	W	Used to control exotic grasses.	Spray	200	10	8:01	10:01

Appendix H - Annual Biodiversity & Rehabilitation Management Report

ANNUAL BIODIVERSITY & REHABILITATION MANAGEMENT REPORT Old Northern Road 2021

Prepared for Dixon Sand Pty Ltd

September 2021 V.1

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Annual Biodiversity

&

Rehabilitation Management

Report

Old Northern Road

2021

Dixon Sand Pty Ltd

This assessment has been prepared by

Melissa Mass

September 2021 V.1

Date

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Abbreviations

Abbreviation	Description
BC Act	*Biodiversity Conservation Act 2016*
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
HRBOA	Haerses Road Biodiversity Offset Area
HTW	High Threat Weed
KPI	Key Performance Indicators
KTP	Key Threatening Process
LEP	Local Environmental Plan
Mod 4	Modification 4
Mod 5	Modification 5
NSW OEH	New South Wales Office of Environment and Heritage
NVC	Native Vegetation Corridor
ONR	Old Northern Road
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
THSC	The Hills Shire Council
VIS	Vegetation Information System
WoNS	Weed of National Significance

1 INTRODUCTION

This report presents the findings of the annual monitoring of the biodiversity value and rehabilitation effort within the Dixon Sand operation at Old Northern Road Maroota and the biodiversity value of the offset vegetation at Haerses Road Maroota.

1.1 BACKGROUND

Dixon Sand Pty Ltd operates a sand extraction and processing operation across 58.4 hectares on Lot 29 DP752025, Lot 196 DP752025, Lot 1 DP547255 and Lot 2 DP547255 Old Northern Road Maroota. The quarry operates in compliance to Development Consent 250-09-01 issued by the Land and Environment Court in 2004.

Several modifications have been made to the Development Consent, the most recent being described as Modification 5. The previous modification, known as Mod 4, involved the clearing of native vegetation for continued sand extraction resulting in consent conditions requiring the management of biodiversity values and impacts. Thus a Biodiversity Offset Strategy for the Old Northern Road quarry site was established which includes a Native Vegetation Corridor (NVC) and the Haerses Road Biodiversity Offset Area (HRBOA).

1.2 OBJECTIVES

The objectives of this Annual Biodiversity and Rehabilitation Management Report is to describe the current condition of the NVC and the HRBOA and to advise Dixon Sand on the appropriate management measures required to be implemented in order to meet the expectations of the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018) prepared by Umwelt (Australia) Pty Ltd.

This report will:

- identify native flora and fauna species, populations and ecological communities known to or likely to occur within the NVC and HRBOA;
- describe the native vegetation and habitats within the NVC and HRBOA;
- describe the current condition of the threatened flora and its habitat found outside of the NVC at Old Northern Road;
- discuss the ongoing monitoring of threatened flora and fauna previously recorded at both ONR and HRBOA;
- determine the legislative and conservation significance of species, populations and ecological communities known or likely to occur within the NVC and HRBOA with reference to the Commonwealth *EPBC Act 1999* and the *NSW BC Act 2016*;
- recommend appropriate biodiversity and environmental management measures that should be implemented to reach criteria for monitoring success set by the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018);
- provide an independent monitoring report for inclusion as part of the external reporting for the quarry Annual Review.

2 METHODOLOGY

2.1 SITE HISTORY

2.1.1 Old Northern Road Native Vegetation Corridor

The NVC on the Old Northern Road quarry site is 6.83 hectares, approximately 100m wide and 650m in length in an east-west direction. Approximately half the area of the NVC has been, or is currently, disturbed for sand extraction and areas dedicated as silt ponds. Approximately 0.8 hectares is currently under active rehabilitation as will be discussed further in this report.

The remaining vegetation within the NVC is disturbed and modified. Livestock grazing, timber removal and fruit orchards in the immediate and adjacent lands have contributed to the ongoing disturbance over many years within this area. As a result, exotic weed species are prolific and at times dominate the landscape. Farm dams have been dug which once provided irrigation to the fruit orchards and watered livestock. They now provide a water source for native and exotic species which occur in the immediate area.

Unsealed tracks are found throughout the NVC which currently provide easy access for vehicles or pedestrians.

2.1.2 Haerses Road Biodiversity Offset Area

The HRBOA is relatively undisturbed native vegetation which covers an area of 8.7 hectares. Four vegetation communities have been identified within the offset which includes habitat for threatened species known to occur in the area. Old vehicle tracks occur within the site although over time, with very little use, the tracks are now suitable for pedestrian access only.

2.1.3 Threatened flora habitat

An area to the west of the Old Northern Road NVC contains threatened flora habitat which has previously been identified and monitored. This area has had very little disturbance due to its location and unsuitability for grazing, farming or logging. A haul road had previously been constructed adjacent to the site however this road is no longer in use and most likely had very minimal impact upon the threatened flora habitat.

2.2 FIELD SURVEY

Botanical surveys of the study area were conducted over several days spread throughout July 2021. Fixed quadrat surveys were set up with long edges running in a west-east direction. Quadrat locations in the HRBOA were each marked with a permanent steel post and a yellow cap in the centre location along the western edge of the quadrat. The Old Northern Road NVC quadrats were marked with flagging tape given that some vegetation within the NVC is still subject to disturbance by sand extraction.

Each quadrat was 20m x 50m which included a subplot of 20m x 20m and 5 line plots of 1m x 1m. A random meander was conducted through most other areas of native vegetation within the study area, to search for threatened flora species, and to record information on habitat condition.

All flora species recorded are listed in Appendix A, B and C of this report.

Vegetation communities were identified and described with reference to the vegetation maps developed by THSC, the NSW Vegetation Information System (VIS), the descriptions in Tozer et al

(2010), and with reference to vegetation descriptions included by the Scientific Committee final determinations to list threatened communities under the *BC Act 2016 and* the *EPBC Act 1999.*

An assessment of fauna habitat was conducted within each survey quadrat to identify suitability for potential threatened fauna species known to occur in the local area.

The habitat assessment included the suitability of landscape features, hollow-bearing trees, stags, fallen timber and logs, rocky outcrops and boulders, flowering Eucalypts, specific feed trees for Glossy Black Cockatoo's, Swift Parrot, Koalas, Grey-headed Flying Fox, site connectivity, vegetation structure and vegetation types.

Searches were also undertaken for indirect evidence of native fauna, including scratches, scats, nests, hollows in use, camps, roosts, den sites etc. Opportunistic sightings of all fauna species were recorded throughout the survey period.

The following fauna survey methods were performed to target threatened species known to occur or likely to occur in the local area:

- General search with direct observation of any fauna species present within the study area, including diurnal and nocturnal call identifications;
- Early morning dedicated bird surveys;
- Unbaited motion detection infra-red digital camera left within the NVC for a total of 18 survey nights;
- Anabat recording device left within the NVC and HRBOA for a total of 18 survey nights.

A list of fauna species recorded across all sites is provided in appendix D and E.

Within each 50m x 20m quadrat the following information was recorded:

- centre of western edge GPS location
- aspect and slope of midline
- photograph of midline from western centre edge
- IBRA region
- vegetation class
- Plant Community Type (PCT)
- stem class including recruitment
- standing hollow count
- overall length of logs

The quadrats 20m x 20m recorded:

- every flora species identified
- abundance of each species recorded
- count of stratum richness
- percentage of High Threat Weed (HTW) cover

From within the five 1m x 1m plots the following information was recorded:

- litter cover
- native overstorey foliage cover
- native midstorey foliage cover
- native groundcover foliage cover
- cryptogam cover
- rock cover

- bare ground

Results collected from the 1m x 1m plots at each site is displayed as an average.

2.3 CRITERIA TO MONITOR SUCCESS OF REHABILITATION

The Key Performance Indicators (KPI) to measure success of the biodiversity and rehabilitation effort of the Old Northern Road NVC and the vegetation management within the HRBOA have been outlined by Umwelt (Australia) Pty Ltd 2018. The following tables depict the performance and completion criteria for both locations.

Table 1. Performance and completion criteria for Old Northern Road NVC (taken from Umwelt Pty Ltd 2018)

Rehabilitation Performance and Completion Criteria	
Native Vegetation	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed)
	More than 75 percent of trees are healthy and growing as indicated by long term monitoring
	More than 50 percent of translocated or propagated threatened flora species survive as indicated by long term monitoring
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum
Weeds and Pests	Regular inspections indicate a decline in weed diversity, density and abundance and a decline in signs of feral animal activity
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum
	There is no evidence of significant damage resulting from feral animal activity

Table 2. Performance and measurable indicators for HRBOA (taken from Cumberland Ecology 2016)

Performance and measurable indicators	
Native Vegetation	Maintenance of current level of native species diversity and abundance
	Maintenance of current level of canopy regeneration
	Measurable increase in habitat features
	Measurable decrease in impacts from feral fauna activity
Weeds	Measurable decline in weed density and distribution
	Measurable decline in weed diversity
	Limited recruitment of new weed species
Feral Animals	Observable reduction in decline of native fauna populations due to either predation by feral species, habitat degradation caused by feral fauna or competition with feral fauna
	Limited recruitment of new feral species
General	Measurable increase in the condition of vegetation

Observable reduction in signs of erosion (if any)
Evidence of restrictions to site access
Observable decrease in bushfire risk

Furthermore, threatened flora species KPI for the translocated individuals and the flora species in-situ are to maintain or increase resident species population from the baseline levels which will be determined from this report.

Threatened fauna species previously identified at the Old Northern Road site and HRBOA are to be maintained or increase in population size based on a presence or absence survey each year following the baseline information within the Biodiversity Rehabilitation Management Plan (Umwelt Pty Ltd 2018).

2.4 SURVEY LIMITATIONS

The flora survey was conducted within a short timeframe during winter. Therefore some plant species may not have been identified due to the survey being performed when not in flower, or when dormant. It is noted that some flora species are seasonal, and may not have been visible at the time of the surveys. Recent rainfall has seen an increase in opportunistic species, such as annual weeds, while perennial species have recovered well from previous drought conditions during 2018-2019. A return to average rainfall conditions have see an increase in native abundance and diversity over time, particularly ground cover species such as forbs, grasses and ferns.

The survey limitations have been addressed through:

- consideration of flora and fauna species known to occur in the locality (including number of records from Bionet);
- consideration of habitat suitability present within the study areas and connectivity to other areas of habitat in the local landscape;
- consideration of current weather conditions;
- a conservative approach in assuming the presence of a species that could potentially be present in the study areas.

Where the study area contains potential habitat for threatened fauna species known to occur in the locality, and where survey areas support a likelihood of occurrence, it has been assumed on a conservative approach that such species may occur in the study area.

3 RESULTS

Results from the field surveys conducted over July 2021 have been separated into four distinct areas to enable quantification of condition for each specific location and its monitoring objectives.

3.1 OLD NORTHERN ROAD

The Old Northern Road NVC is currently in the mid stage of its rehabilitation strategy. Rehabilitation has begun within Lot 29 while extraction continues in Lot 1 and 2. Collection of propagation material from threatened flora species, *Melaleuca deanei* and *Darwinia fascicularis subsp oligantha*, has taken place with enough successful clone individuals been successfully raised to meet the approved quota. The *M. deanei* individuals are required to be established and actively growing in the ground before the removal of the parent plant can be undertaken. An attempt to translocate the parent plant into the active rehabilitation area will be made at the time of removal from its current location. If this is successful there will be a zero loss of this species on the site.

Dedicated rehabilitation of native vegetation on Lot 29 begun in late 2017. An area of approximately 0.8 hectares was selected and prepared for three rehabilitation methods to use as a comparison for future reference. The larger area (approximately 0.4 hectares) has been planted out using local provenance stock and plants derived from material collected from threatened species onsite. In total 47 species have been planted within the rehabilitation area, including two threatened species. Artificial habitat structures such as rock, logs and plant debris have been placed around the rehabilitation site to provide habitat for small birds and reptiles.

Two adjacent areas, of approximately similar sizes, have undergone rehabilitation in conjunction with the planted rehabilitation. The area to the immediate south of the planted rehabilitation has undergone translocation of plant material, including root balls of several species together. This is a particularly successful conservation tool when used for threatened species which have little chance of survival in their current location. This approach has been used here to relocate *Darwinia fascicularis subsp*. *oligantha* along with flora species found within immediate and close proximity of each cluster of the threatened plants. Habitat features such as rocks, logs and plant debris have also been placed around the site to provide habitat for small birds, reptiles and to create microhabitats for dependant flora species.

The far western area of the NVC rehabilitation area has been spread with soil containing native seed bank and supplementary planting of threatened flora species. Habitat features have also been provided in this location.

Monitoring of vegetation condition has begun in other areas of the NVC, including areas which will be subjected to disturbance from sand extraction. The information gained from the pre-disturbance monitoring will provide Dixon Sand with quantitative data which can be used to rehabilitate the NVC back to, or close to, its pre-disturbance state.

Other areas of vegetation monitoring outside of the established rehabilitation corridor has also taken place to determine the effects of the sand extraction project on retained vegetation.

3.1.1 Rehabilitation area – Planted

The planted rehabilitation area is approximately 0.4 hectares in size and has been planted with 47 native species including 2 species listed on the *BC Act 2016* as being species of significance, *Melaleuca deanei* (vulnerable) and *Darwinia fascicularis subsp. Oligantha* (endangered population).

In addition to the revegetation planting a number of species have emerged from seed bank storage from the sub-soil which was spread over the rehabilitation site before planting commenced. In total 44 native species which were not recorded as planted within the rehabilitation site were identified during the survey period including the endangered species *Acacia byoneana* and the vulnerable species *Tetratheca glandulosa*. This is an increase of 2 species since last year which appears to have appeared from seed bank stored in the soil until ideal growing conditions occurred. There were no weed species identified within the planted revegetation area.

There were 15 live specimens of *Melaleuca deanei,* 17 live specimens of *Darwinia fascicularis subsp. Oligantha,* 2 live specimens of *Acacia byoneana* and 5 live specimens of *Tetratheca glandulosa* located within the planted rehabilitation area. Although there is a slight reduction of live threatened specimens located this year it could be that these individuals were unable to be located due to the density of regrowth which has occurred throughout the site over the past 12 month period.



Image 1. View of planted rehabilitation area from north-west corner looking east 2020



Image 2. Comparison view of planted rehabilitation area from north-west corner looking east 2021

South East Environmental



Image 3. View of planted rehabilitation area from south-east corner looking west 2020



Image 4. Comparison view of planted rehabilitation area from south-east corner looking west 2021

South East Environmental



Image 5. Planted *Melaleuca deanei* within the planted rehabilitation area 2021

South East Environmental



Image 6. Planted *Darwinia fascicularis subsp. Oligantha* within the planted rehabilitation area 2021



Image 7. *Tetratheca glandulosa* within the planted rehabilitation area 2021

South East Environmental

3.1.2 Rehabilitation area – Translocated

The translocated rehabilitation area was not subjected to a flora survey as per the vegetation survey site locations suggested in the Biodiversity Rehabilitation Management Plan 2018. However a random meander through the area recording flora species was undertaken. Species identified and recorded can be found in Appendix B. Photo monitoring should, over time, be sufficient to determine the rehabilitation success of this area.

Overall coverage of vegetation from the translocation and continued recruitment from seed bank storage appears to be ample. Translocated *Darwinia fascicularis subsp. Oligantha* is numerous, particularly on the western side of the site. All age classes were observed from small seedlings to adult shrubs which were flowering well at the time of the survey period.

A single *Tetratheca glandulosa* which was translocated during the previous reporting period appears in a healthy state with flowers present during July suggesting flowering will continue to occur over the coming months. A further individual was located within the translocation area which has grown from seed bank within the soil.



Image 8. Translocated *Tetratheca glandulosa* flowering within the translocation area July 2021

Two *Melaleuca deanei* which were planted within this area in 2017 are still present and appear healthy. A further twenty three *M. deanei* have been planted within this area during the reporting period. All plants appear to be doing well with some showing signs of active growth. These plants will continue to be closely monitored over the coming months.

There is currently no upper canopy within this area however *Eucalyptus sp,, Corymbia sp.* and *Angophora hispida* recruits were observed. Shrubs and ground cover plants are abundant throughout the area.



Image 9. Established *Melaleuca deanei* and recently planted clone within the translocation area

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Image 10. *Darwinia fascicularis subsp. oligantha* within the translocation area

3.1.3 Rehabilitation area – Soil seed bank

The soil seed bank rehabilitation area was not subjected to a flora survey as per the vegetation survey site locations suggested in the Biodiversity Rehabilitation Management Plan 2018. A random meander through the area recording flora species was undertaken and a count of living planted threatened species was recorded. Photo monitoring of the area will determine rehabilitation success.

Ample natural recruitment of native species is occurring across the site with recruitment of *Darwinia fascicularis subsp. Oligantha* evident. No canopy stratum is present although juvenile *Eucalyptus sp* were observed. *Acacia suaveolens* dominates the recovering shrub layer with *Grevillea buxifolia* and *Banksia ericifolia* also widespread. Ground cover species are present throughout.

There were 27 *Darwinia fascicularis subsp. oligantha* identified scattered throughout the site, some of which are new recruits. One planted *Melaleuca deanei* was located. The density of the shrub regrowth is suspected of hampering the efforts to locate other individuals. All the surviving threatened species present appear to be healthy.



Image 11. View of translocated rehabilitation area from south-west looking east 2020



Image 12. Comparison view of translocated rehabilitation area from south-west looking east 2021



Image 13. View of translocation rehabilitation area from north-west looking east 2020

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Image 14. Comparison view of translocation rehabilitation area from north-west looking east 2021



Image 15. View of soil seed bank rehabilitation area from north looking south 2020



Image 16. Comparison view of soil seed bank rehabilitation area from north looking south 2021



Image 17. View of soil seed bank rehabilitation area from south looking north 2020



Image 18. Comparison view of soil seed bank rehabilitation area from south looking north 2021

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3.1.4 Vegetation monitoring within NVC

The Biodiversity Rehabilitation Management Plan 2018 indicates that nine vegetation monitoring sites should be established across the Old Northern Road site. Five of these sites occur within the NVC including one site within the planted rehabilitation area discussed in 3.1.1 of this report.

From the remaining four sites only two could be safely accessed for monitoring. The two remaining monitoring sites are currently disturbed for sand extraction.

The vegetation in the surveyed area is described in the Biodiversity Rehabilitation Management Plan 2018 as being *Eucalyptus punctata* woodland. The vegetation community in this location appears to be in a transition zone with influences from dry ridgetop woodland, heathland and gully forests emerging in one location. The species recorded within the survey site came to the determination that the VIS classification for this PCT best fit is *1328 - Yellow Bloodwood - Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion.* Information collected during the survey period has been summarised in Table 3 while a full list of flora recorded can be found in Appendix A.

An additional survey plot, Plot 3, was included in this years monitoring where active *Lantana Camara* management has been taking place allowing for further access. A vegetation plot of 20m x 20m was established however the larger plot of 50m x 20m could not be achieved due to *Lantana camara* thickets remaining. It is expected over time the larger plot will be included in this monitoring as the Bush Regenerators remove the *Lantana camara* from within the site. Plot 3 vegetation is largely dominated by exotic weed species as a result of the disturbance caused by the *Lantana camara* and its removal. Recovering native vegetation is present with pioneer species, many of these being fast growing nitrogen fixing species. With further weed control within the management areas the native species should recover in time with greater density and diversity.

The overall health of the vegetation and biodiversity within the NVC is moderate. There has been historic disturbance in the area most likely from livestock grazing and timber removal. Recent average rainfall in the local area has assisted in the recovery of vegetation from the previous drought conditions across all affected stratums with ground cover species showing good signs of recovery.

The remaining areas throughout the NVC continue to be severely impacted from the presence of *Lantana camara*. An effort to remove and control the species has begun in earnest however due to the distribution and density it will require long term management to completely remove the species across the entire site.

Table 3. Survey summary from NVC survey site location ONR quadrat 2.

1328 - Yellow Bloodwood - Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0313182 Northing – 06296257 Midline - 89°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	15 – 20m	*Corymbia gummifera, Eucalyptus punctata, Eucalyptus haemastoma, Angophora bakeri, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Acacia linifolia, Grevillea buxifolia, Persoonia pinifolia, Phyllanthus hirtellus, Lambertia Formosa, Petrophile pulchella*		
Groundcover	0.1 – 0.5m	*Pratia purpurascens, Lomandra longifolia, Entolasia stricta, Themeda australis,*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		1	2
30-49cm	✓		2	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	70	
Shrubs		22	50	
Grasses etc		8	55	
Forbs		3	7	
Ferns		1	1	
Other		1	3	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	46 m			
Litter cover	60%			
Bare ground cover	0%			
Cryptogam cover	36%			
Rock cover	5%			
Overstorey foliage cover	50%			
Mid-storey foliage cover	56%			
Groundcover foliage cover	42%			

Table 4. Survey summary from NVC survey site location ONR quadrat 3

1328 - Yellow Bloodwood - Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0313239 Northing – 06296521 Midline - 90°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	2 - 5m	*Acacia parramattensis, Allocasuarina littoralis, Glochidion ferdinandi*		
Shrubs	0.5 – 2m	*Bossiaea heterophylla, Trema tomentosa var. aspera, Breynia oblongifolia*		
Groundcover	0.1 – 0.5m	*Lomandra longifolia, Imperata cylindrica, Stephania japonica, Einadia hastata*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm				
30-49cm				
20-29cm				
10-19cm		✓		
5-9cm		✓		
<5cm		✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		3	10	
Shrubs		3	20	
Grasses etc		3	2	
Forbs		2	1	
Ferns		0	0	
Other		1	1	
High Threat Weeds		6	20	

Ecosystem Functions (includes exotic species)	
Length of habitat logs	0m
Litter cover	10%
Bare ground cover	0%
Cryptogam cover	0%
Rock cover	0%
Overstorey foliage cover	10%
Mid-storey foliage cover	20%
Groundcover foliage cover	80%



Image 19. Midline view of NVC survey quadrat 2 2021



Image 20. Midline view of NVC survey quadrat 3 2021

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3.1.5 Vegetation monitoring outside NVC

There were four monitoring sites identified outside of the NVC which were proposed to be surveyed. Two of these locations were unable to be accessed due to sand extraction currently taking place. Another of the locations was not able to be accessed due to impenetrable thickets of *Lantana camara*. The remaining monitoring site and an additional monitoring site were selected for surveying to provide baseline data for ongoing assessment over the site.

The vegetation within Plot 1 was determined to be PCT *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*. This survey location is outside of the NVC although within the 250m buffer area to Maroota Public School in the southeast corner of the site. This area has had historic disturbance most likely from timber harvesting. An abundance of *Eucalyptus piperita* are regenerating within this quadrat at around the same age class which suggests at some stage the area was once cleared. Despite this, the diversity within the survey site is reasonable and the biodiversity values are moderate. The area where this quadrat is located will not be subjected to clearing so will therefore provide an opportunity for monitoring the effects of sand extraction in nearby retained vegetation.

The additional survey site, Plot 4, was undertaken within an area of vegetation determined to also be PCT *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*. This survey location is just within the 250m buffer to the Maroota Public School in the centre of the site and will not be subject to clearing for quarry activities. It is therefore likely to provide good baseline data for rehabilitation of the vegetation community for future reference. The vegetation within the survey plot appears to have very little disturbance and contains no exotic weed species.

The remaining vegetation within the 250m buffer area appeared to have some impacts from the spread and growth of Lantana camara therefore a third survey quadrat within the recommended survey area was not undertaken. Efforts have been made to reduce the impacts from the invasive species however the progress is slow and favourable weather conditions for growth have made control difficult.

Table 5. Survey summary for area outside NVC Survey site location ONR quadrat 1

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0313250 Northing – 06296390 Midline - 230°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Eucalyptus piperita, Eucalyptus punctata, Angophora costata, Allocasuarina littoralis, Ceratopetalum gummiferum*		
Shrubs	0.5 – 2m	*Leptospermum polygalifolium, Kunzea ambugia, Phyllanthus hirtellus, Lambertia formosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Lomandra filiformis, Pteridium esculentum, Lomandra longifolia, Cythochaeta diandra, Entolasia stricta, Microleana stipoides*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm				
30-49cm	✓		1	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	80	
Shrubs		13	45	
Grasses etc		10	50	
Forbs		8	7	
Ferns		1	2	
Other		3	4	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	13.1m			
Litter cover	80%			
Bare ground cover	0%			
Cryptogam cover	40%			
Rock cover	5%			
Overstorey foliage cover	75%			
Mid-storey foliage cover	50%			
Groundcover foliage cover	40%			

Table 6. Survey summary for area outside NVC Survey site location ONR quadrat 4

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0313263 Northing – 06296592 Midline - 90°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Eucalyptus piperita, Eucalyptus pilularis, Angophora costata, Allocasuarina littoralis, Ceratopetalum gummiferum, Xylomelum pyriforme*		
Shrubs	0.5 – 2m	*Banksia spinulosa, Persoonia pinifolia, Acacia ulicifolia, Bossieaea heterophylla, Indigofera australis, Hakea sericea*		
Groundcover	0.1 – 0.5m	*Pteridium esculentum, Lomandra multiflora, Cythochaeta diandra, Entolasia stricta, Microleana stipoides, Smilax glyciphylla*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		2	2
30-49cm	✓		3	
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		7	70	
Shrubs		23	60	
Grasses etc		18	20	
Forbs		6	5	
Ferns		2	5	
Other		4	5	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	32m			
Litter cover	60%			
Bare ground cover	0%			
Cryptogam cover	20%			
Rock cover	20%			
Overstorey foliage cover	60%			
Mid-storey foliage cover	50%			
Groundcover foliage cover	20%			



Image 21. Midline view of ONR quadrat 1 2021

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Image 22. Midline view of ONR quadrat 4 2021

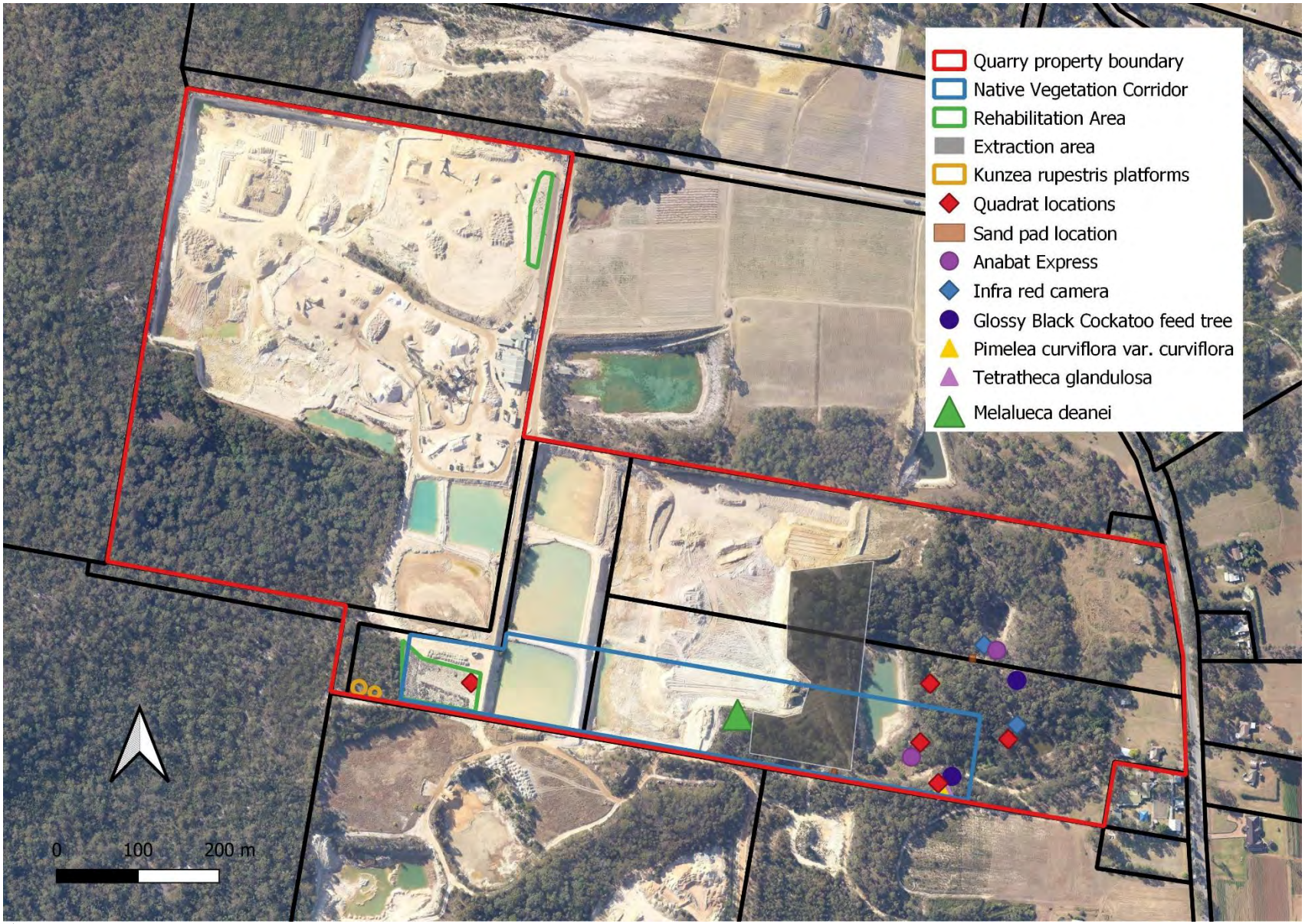


Image 23. ONR survey site locations 2021

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3.2 HAERSES ROAD BIODIVERSITY OFFSET AREA

The HRBOA has a total of five monitoring sites specifically to provide benchmark values for the vegetation communities found within the site. Baseline data collected and discussed within this report will enable a measurable value of success for management actions which may be implemented over the life of the offset.

It is expected over time there will be an increase in biodiversity, habitat features, ongoing evidence of natural recruitment and a decrease in exotic fauna and flora presence.

Each of the survey locations has been permanently marked with a steel post and yellow cap indicating the plot identification number.

Cumberland Ecology (2016) had previously identified four vegetation communities onsite as Sydney sandstone Ridgetop Woodland, Sydney Hinterland Transition Woodland, Sydney Sandstone Gully Forest and Sydney Sandstone Heath (Heath/Woodland Complex). Each survey location surveyed was given a best fit PCT based on the classification of the VIS which was determined by the native species most abundant throughout the quadrat. Therefore the following PCT's were identified:

- Plot 1 - *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*
- Plot 2 – *1641 – Dwarf Apple – Scribbly Gum heathy low woodland on sandstone ranged of the Central Coast*
- Plot 3 - *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*
- Plot 4 – *1627 – Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast*
- Plot 5 – *1643 – Red Bloodwood – Smooth-barked Apple – Scribbly Gum – Old Man Banksia heathy woodland on sandstone ranges of the Central Coast*

These PCT's are in line with the broader definition given in the Cumberland Ecology Biodiversity Management Plan 2016, although the location of the Sydney Hinterland Transition Forest was not surveyed.

Plot 2 had an abundance of the threatened flora species *Darwinia biflora* present. This shrub was noted to be very well represented throughout the entire area of the PCT 1641.

Overall there was an increase to foliage cover and structure cover in most stratums at most survey sites. Grass and ground cover species appear to have improved in density following recent average rainfall. Extensive Long-nosed Bandicoot digs were noted in an area close to Quadrat 1. Bird presence and density has remained consistent from last survey period, likely due to the favourable weather conditions.

The following tables (6 – 10) are a summary of the survey results at each of the plot locations across HRBOA.

Table 7. Survey summary for survey site location HRBOA quadrat 1

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0312740 Northing – 06293489 Midline - 130°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Angophora costata, Corymbia gummifera, Allocasuarina littoralis, Ceratopetalum gummiferum, Banksia Serrata*		
Shrubs	0.5 – 2m	*Leptospermum trinervium, Persoonia pinifolia, Lambertia Formosa, Bossiaea scolpendria, Grevillea speciosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Caustis flexosa, Pteridium esculentum, Lomandra glauca, Cassytha glabella, Smilax glyciphylla, Xanthorrhoea media*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		1	1
30-49cm	✓		1	
20-29cm	✓	✓		
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	60	
Shrubs		19	60	
Grasses etc		7	10	
Forbs		4	5	
Ferns		1	15	
Other		3	5	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	26.5m			
Litter cover	80%			
Bare ground cover	0%			
Cryptogam cover	2%			
Rock cover	30%			
Overstorey foliage cover	70%			
Mid-storey foliage cover	40%			
Groundcover foliage cover	20%			



Image 24. Midline view of HRBOA quadrat 1 2021

Table 8. Survey summary for survey site location HRBOA quadrat 2

1641 – Dwarf Apple – Scribbly Gum heathy low woodland on sandstone ranged of the Central Coast				
AGD Zone 56 Easting – 0312750 Northing – 06293649 Midline - 100°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	2 – 10m	*Angophora hispida, Eucalyptus haemastoma*		
Shrubs	0.5 – 2m	*Banksia ericifolia, Hakea sericea, Leptospermum trinervium, Hakea dactyloides, Lambertia Formosa, Bossiaea scolpendria, Grevillea speciosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Caustis pentandra, Actinotus minor, Xanthoria tridentata, Asplenium trichomanes, Lepidosperma laterale, Cassytha glabella, Entolasia stricta*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		1	
30-49cm		✓		
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		2	20	
Shrubs		24	100	
Grasses etc		7	70	
Forbs		1	5	
Ferns		2	2	
Other		3	4	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	9.3m			
Litter cover	40%			
Bare ground cover	0%			
Cryptogam cover	10%			
Rock cover	5%			
Overstorey foliage cover	15%			
Mid-storey foliage cover	50%			
Groundcover foliage cover	50%			



Image 25. Midline view of HRBOA quadrat 2 2021

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Image 26. Flowering *Darwinia biflora* located within HRBOA quadrat 2

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Table 9. Survey Summary of survey location HRBOA quadrat 3

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0312877 Northing – 06293628 Midline - 110°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Corymbia gummifera, Eucalyptus piperita, Eucalyptus punctata, Banksia serrata, Ceratopetalum gummiferum, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Leptospermum trinervium, Dodonea viscosa, Persoonia pinifolia, Bossiaea lenticularis, Grevillea speciosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Dianella caerulea, Pteridium esculentum, Lindsaea microphylla, Lomandra filliformis, Lomandra multiflora, Cassytha glabella, Entolasia stricta, Caustis flexosa*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		3	
30-49cm	✓		1	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	90	
Shrubs		17	45	
Grasses etc		8	10	
Forbs		7	2	
Ferns		3	6	
Other		3	3	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	10.1m			
Litter cover	55%			
Bare ground cover	5%			
Cryptogam cover	18%			
Rock cover	22%			
Overstorey foliage cover	20%			
Mid-storey foliage cover	10%			
Groundcover foliage cover	10%			



Figure 27. View of midline HRBOA quadrat 3 2021

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Table 10. Survey Summary of survey location HRBOA quadrat 4

1627 – Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast				
AGD Zone 56 Easting – 0312847 Northing – 06293808 Midline - 100°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Corymbia gummifera, Eucalyptus resinifera, Angophora costata, Callicoma serratifolia, Ceratopetalum gummiferum, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Leptospermum trinervium, Telopea speciossima, Persoonia pinifolia, Bossiaea lenticularis, Lambertia formosa, Boronia floribunda*		
Groundcover	0.1 – 0.5m	*Dianella caerulea, Pteridium esculentum, Gahnia sieberiana, Lomandra filliformis, Lomandra longifolia, Smilax glyciphylla, Entolasia stricta, Caustis flexosa*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+	2		2	1
50-79cm	✓		2	3
30-49cm	✓		2	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		7	80	
Shrubs		18	70	
Grasses etc		13	24	
Forbs		5	3	
Ferns		3	12	
Other		3	2.5	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	45.3m			
Litter cover	45%			
Bare ground cover	5%			
Cryptogam cover	40%			
Rock cover	5%			
Overstorey foliage cover	25%			
Mid-storey foliage cover	60%			
Groundcover foliage cover	20%			



Image 28. View of midline HRBOA quadrat 4 2021

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Table 11. Survey Summary of survey location HRBOA quadrat 5

1643 – Red Bloodwood – Smooth-barked Apple – Scribbly Gum – Old Man Banksia heathy woodland on sandstone ranges of the Central Coast				
AGD Zone 56 Easting – 0312938 Northing – 06293983 Midline - 130°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Eucalyptus punctata, Eucalyptus haemastoma, Angophora hispida, Banksia serrata, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Lambertia formosa, Persoonia pinifolia, Bossiaea scolopendra, Grevillea buxifolia, Banksia ericifolia, Boronia floribunda, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Actinotus minor, Xanthosia pilosa, Lomandra longifolia, Entolasia stricta, Xanthorrhoea resinosa*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm				
30-49cm	✓		3	
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		5	20	
Shrubs		24	70	
Grasses etc		11	20	
Forbs		4	5	
Ferns		1	5	
Other		3	1	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	18.9m			
Litter cover	59%			
Bare ground cover	1%			
Cryptogam cover	20%			
Rock cover	30%			
Overstorey foliage cover	15%			
Mid-storey foliage cover	30%			
Groundcover foliage cover	15%			



Image 29. View of midline HRBOA quadrat 5 2021

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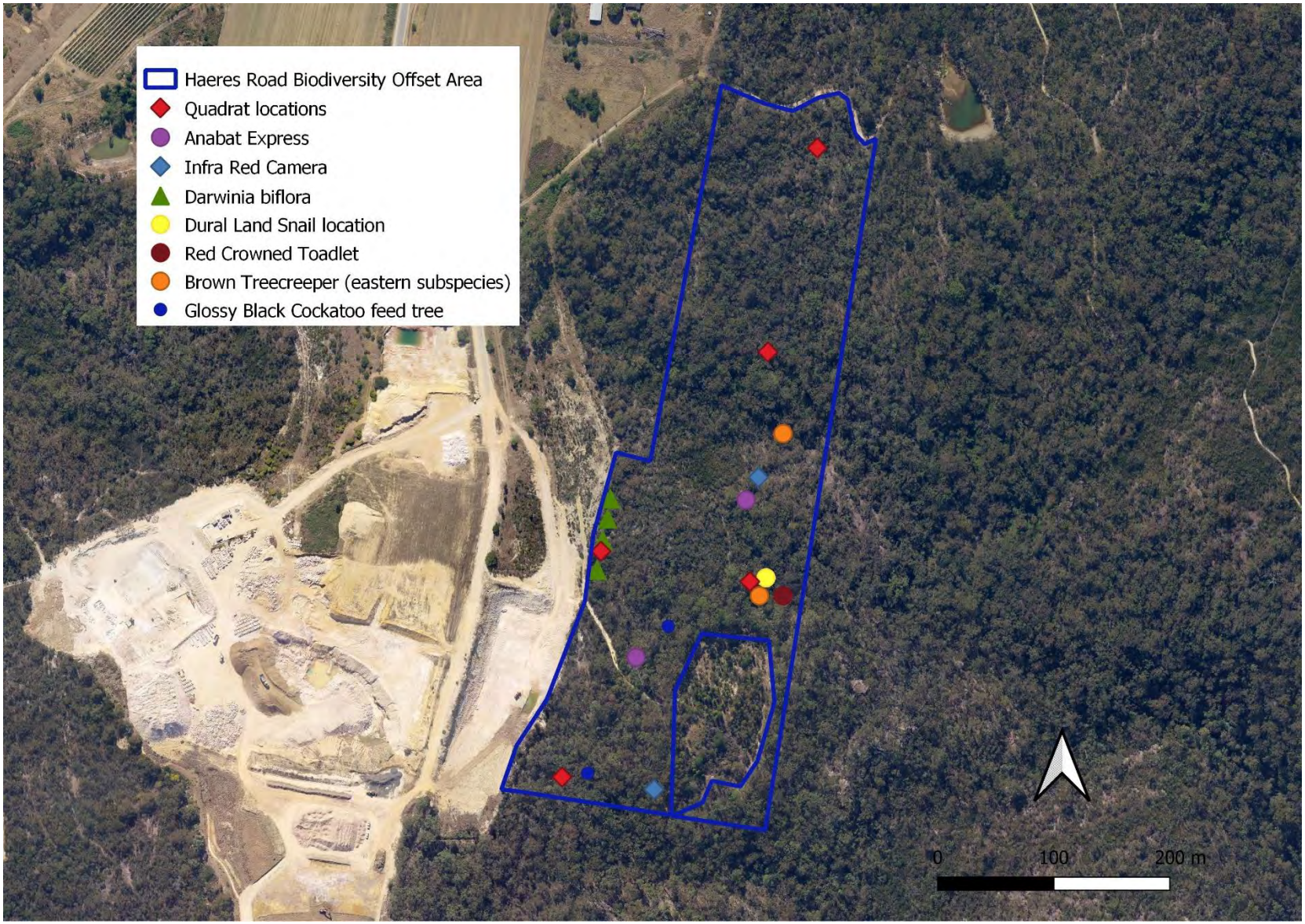


Image 30. HRBOA site location 2021

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3.3 Threatened Flora Monitoring

The threatened flora monitoring details the current condition of the four threatened flora species and their immediate habitat which has been previously recorded onsite. The far western area of Lot 29 contains a significant rock platform which supports *Kunzea rupestris* and *Darwinia fascicularis subsp oligantha*. Lot 2 contains *Melaleuca deanei* and *Tetratheca glandulosa*. During flora surveying in July 2020 several *Pimelea curviflora var curviflora* were also identified. The *Pimelea curviflora var curviflora* were identified again in July 2021.

The overall health of the *Kunzea rupestris* population is reasonable considering the two years of dry weather conditions experienced during 2017-2019. Some dieback and plant loss was observed however the remaining plants appear to be in good health. Some recruitment is evident, particularly on the western rock platform where vacant soil is available. New growth on most plants was observed during the survey period, however no flower buds were noted this year. Mosses and lichens were present in each patch on both platforms.

The eastern rock platform has been divided into four individual patches. Patch one had previously identified twenty six individual plants. During the July 2021 survey period twenty two individuals were counted. The dry conditions over 2017 and 2019, and in particular the extreme heat days which were experienced during the summer months throughout that time, is the expected cause for loss of plant density. Some remaining plants still have dead limbs attached although many appear to have new shoots sprouting below the dead wood. The remaining patch is in relatively good health given the extreme dry weather conditions. *Darwinia fascicularis subsp oligantha* is also present within this patch.

Patch two is much smaller with only three plants present. All three have dead limbs from dry weather dieback although new growth is occurring across the live branches. Within patch three the two persistent plants have also showed signs of dry weather dieback although appear to be recovering with new growth present. In patch four the five *Kunzea rupestris* appear to have survived despite showing some signs of minor dieback.

The western rock platform has been divided into five individual patches which are much more widely distributed than the patches on the eastern rock platform. Within this section the *Kunzea rupestris* grows within a vegetation community with far more flora diversity than what is present on the eastern rock platform. Some of the shrubs are therefore much larger as soil depth and protection from external influences (such as wind and radiant heat) is more readily available.

Patch one has six plants present. *Calytrix tetragona* and *Darwinia fascicularis subsp oligantha* were also present within this patch. A fallen dead *Banksia ericifolia* remains within the patch. Patch two is a long patch which runs down the length of the rock platform. There appears to have been very little change to this patch from last year. New recruits have appeared particularly on the edge of the soil profile. In total thirty individual plants were identified within this patch. All plants in this location are low growing and showed little or no evidence of dieback. Additional species identified within this patch included *Calytrix tetragona*, *Acacia hispidula*, *Grevillea buxifolia, Caustis flexuosa* and *Darwinia fascicularis subsp oligantha.*

Patch three does not contain any *Kunzea rupestris* plants. The patch is considered for monitoring over time with the hope that new recruits will eventually appear. A single *Leucopogon parviflorus* is currently the only species within this patch.

Patch four currently has twenty four *Kunzea rupestris* plants with several of those being juvenile recruits. There was no evidence of dieback on any of the plants identified in this patch. Other flora species identified within the patch were *Calytrix tetragona*, *Grevillea buxifolia, Caustis flexuosa*, *Darwinia fascicularis subsp oligantha, Banksia ericifolia, Isopogon anethifolius, Bossiaea scolopendria* and *Petrophile pulchella.*

Patch five had twenty two *Kunzea rupestris* growing within a diverse mix of shrub species. Several of the counted individuals appear to be new recruits close to the old haul track. No plants appear to have evidence of dieback although some *Banksia ericifolia, Isopogon anethifolius* and *Calytrix tetragona* were demonstrating some dieback and loss. Other species within this patch include *Acacia ulicifolia, Corymbia eximia, Dianella revolute, Grevillea buxifolia, Grevillea speciosa, Leucopogon parviflorus, Angophora hispidula, Caustis flexuosa*, *Persoonia levis*, *Isopogon anethifolius* and *Petrophile pulchella.*

Other threatened species located onsite were observed and inspected for current health and condition. The previously recorded *Melaleuca deanei* is still currently undisturbed within the Banksia heath plant community. Propagation material was removed during Spring 2020 in an attempt to produce further successful clones from the parent plant. The plant appears to have not suffered any ill effects from previous multiple small branch removal during propagation. There is evidence that the parent plant has had a hard shelled scale infestation which has caused some individual leaves to die. This does not appear to have had an effect on the overall health of the plant. No flowers were observed during the 2020-2021 period. In total there were 31 stems in 18 clumps covering an area of 25m². The highest shrubs were approximately 2.5m tall.

Darwinia fascicularis subsp oligantha was observed as being plentiful in the location of the *Kunzea rupestris* population and surrounding area. Plants were flowering well and new recruits were evident throughout the area. They were also very well represented throughout the rehabilitation areas. The *Tetratheca glandulosa* plant previously observed onsite by Umwelt could not be located. It is likely this plant has died from the dry weather conditions or has fallen victim to predation from herbivore grazers. However there were *Tetratheca glandulosa* identified within Quadrat 2 during the July 2021 flora survey period. In addition to this an abundance of flowering *Pimelea curviflora var curviflora* was also identified within the same quadrat site. The threatened species within this location will continue to be monitored each year they remain present onsite.



Image 31. *Kunzea rupestris* monitoring eastern rock platform photo location 1 2021

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Image 32. *Kunzea rupestris* monitoring eastern rock platform photo location 2 2021

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Image 33. 2021 eastern rock platform patch number 1-3, top 1 - bottom 3

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Image 34. *Kunzea rupestris* monitoring western rock platform photo location 1 2021



Image 35. *Kunzea rupestris* monitoring western rock platform photo location 2 2021

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Image 36. *Kunzea rupestris* monitoring western rock platform photo location 3 2021

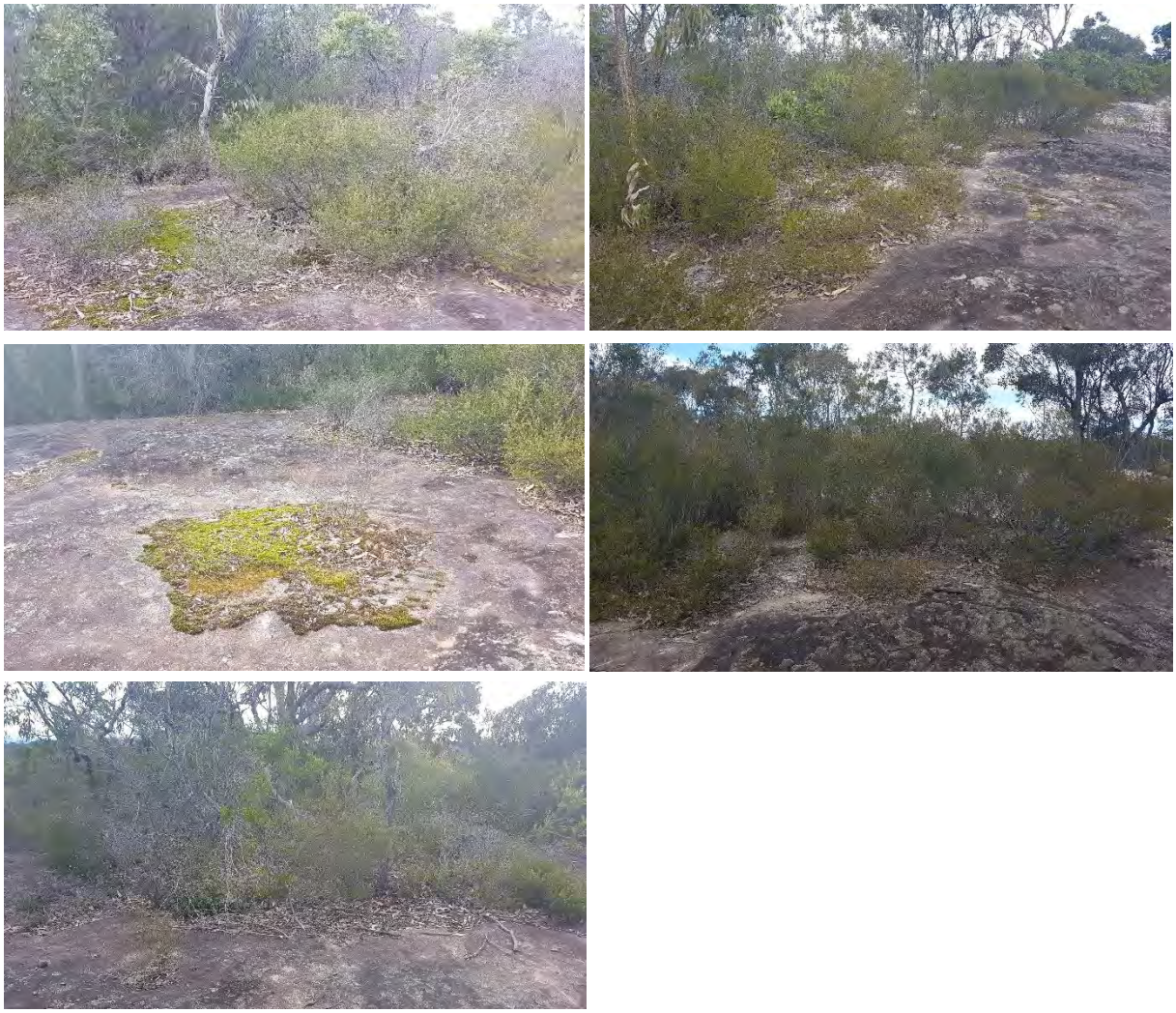


Image 37. 2021 western rock platform patch number 1-5, top left 1 top right 2 middle left 3 middle right 4 bottom 5



Image 38. *Kunzea rupestris* light coloured new growth on eastern rock platform July 2021

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Image 39. *Darwinia fascicularis subsp. oligantha* in flower on western rock platform July 2021



Image 40. *Tetratheca glandulosa* within Quadrat 2 2021

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Image 41. *Pimelea curviflora var curviflora* within Quadrat 2 2021

3.4 Threatened Fauna Monitoring

Threatened fauna previously located within the Old Northern Road site included four species of microchiropteran bat and a Glossy Black Cockatoo.

A search was undertaken for Glossy Black Cockatoo feed trees throughout the site. Feed tree location was confirmed within the translocation rehabilitation area, transect 3 of the NVR and within the 250m buffer from Maroota Public School. Two individual birds were observed feeding in trees within the translocation rehabilitation area during May 2021. The birds appeared to be a male and female pair. Age of the birds were undetermined.

An AnaBat Express sound recorder was left in place over 13 survey nights. The results were sent to Dr Anna McConville from Echo Ecology and Surveying for analysis. Two of the previously recorded threatened bat species were recorded within the survey area during this survey period, Little Bent-winged Bat *Miniopterus australis* and Eastern Free-tailed Bat *Mormopterus norfolkensis*. In addition to this the Greater Broad-nosed Bat *Scoteanax rueppellii*, Large-eared Pied Bat *Chalinolobus dwyeri*, Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Large Bent-winged Bat *Miniopterus orianae*

oceanensis, Southern Myotis *Myotis Macropus* and Eastern Cave Bat *Vespadelus troughtoni* potentially occurred within the site however the recorded calls could not be confidently identified. Live trapping was not conducted to reduce unnecessarily stress on fauna. Continued summer surveying for bat species will provide tangible conclusions for which species are expected to occur annually within the site.

No other threatened fauna were observed within or immediately surrounding the Old Northern Road site during the survey period. The resident pair of Wedged-tailed Eagles were observed flying over the site several times throughout the year.

The HRBOA previously had two threatened fauna species recorded on the property, although outside of the offset area. A historic Bionet record of a Koala and Glossy Black Cockatoo sighting to the north of the property towards Hitchcock Road was not investigated any further for the purpose of this report. Koala sightings in the area, particularly around Glenorie, have increased since the Wollemi/Yengo mega-bushfire over the spring/summer of 2019/2020. A search for Koala scat under *Eucalyptus punctata* within all survey quadrats at the HRBOA was undertaken. No scats were found.

Glossy Black Cockatoo feed trees were observed within quadrat 1 and just east of quadrat 2. It is likely more feed trees will be observed within the site over time as more surveying is undertaken. Several Brown Treecreepers were observed foraging again during the 2021 survey period within the site at various locations indicating these are permanent residents within the site. A survey for microchiropteran bat species using an AnaBat Express sound recorder was undertaken during January 2021. The Large-eared Pied Bat *Chalinolobus dwyeri*, Eastern Free-tailed Bat *Mormopterus norfolkensis*, and the Little Bent-winged Bat *Miniopterus australis* were identified by Dr Anna McConville over 7 nights of survey effort. In addition to this the Greater Broad-nosed Bat *Scoteanax rueppellii*, Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Large Bent-winged Bat *Miniopterus orianae oceanensis*, Southern Myotis *Myotis Macropus* and Eastern Cave Bat *Vespadelus troughtoni* potentially occurred within the site however the recorded calls could not be confidently identified. The survey fauna results can be seen in Appendix D and E.

3.5 Exotic Species

Exotic flora species were identified within the NVC and 250m buffer area at the Old Northern Road site. Three species considered as High Threat Weeds (HTW) under the *Biosecurity Act 2015* occur on the property, Whiskey Grass *Andropogon virginicus,* Fireweed *Senecio madagascariensis* and the most widespread on the property Lantana *Lantana camara.* Two of those weed species, Fireweed and Lantana, are also listed as Weeds of National Significance (WoNS) as determined by the Commonwealth Government. A weed management program is currently in place and will continue throughout the life of the rehabilitation plan. There were no weeds identified within the HRBOA however annual sweeps of the property are recommended to ensure any outbreaks are managed and controlled before species become established.

A weed distribution map has been developed which will be updated yearly to allow for annual comparison. The weed management contractor should aim to reduce the size of these areas on an annual basis with the ultimate goal of eradication, particularly of WoNS and HTW.

Exotic fauna species were identified within the NVC at the Old Northern Road site. Infra-red cameras were left in place for 14 survey nights and 2 sand plots were established and checked every second morning for 7 days.

The sand plots had evidence of several species using the trails. For the purpose of the exotic fauna monitoring three species were identified: European Red Fox, Cat and Dog. The full results can be

seen in Appendix D. Sand plot monitoring was not undertaken at HRBOA however tracks were regularly checked for fauna prints. One dog print was identified on a track between quadrat 1 and 2.

European Rabbit scats were observed in several locations within the NVC in low to moderate density. It could then be assumed that carnivore scats also observed onsite were most likely from the European Red Fox. As no Rabbits were observed feeding during the day, scats were not in high density and large warrens were not observed the population can be considered to be low to moderate and likely to be kept under control by biological means such as predation from foxes, dogs, cats and birds of prey such as the Wedge-tailed Eagle observed flying nearby. Should the number of rabbits become problematic then it may be necessary to engage in a control program to reduce or eliminate the population.

The Noisy Minor, *Manorina melanocephala*, was also observed within the NVC and 250m buffer area at the Old Northern Road Site. Although this bird is a native species to eastern Australia it is worth mentioning here as the species is considered a pest in high density and a Key Threatening Process to many threatened species of small bird including the Brown Treecreeper, which was identified at HRBOA. The population of Noisy Minor appeared to be small and a variety of small birds were observed on site during the survey period. The population should be monitored over time to ensure the species does not become dominant and eliminate other bird species from the vegetation.

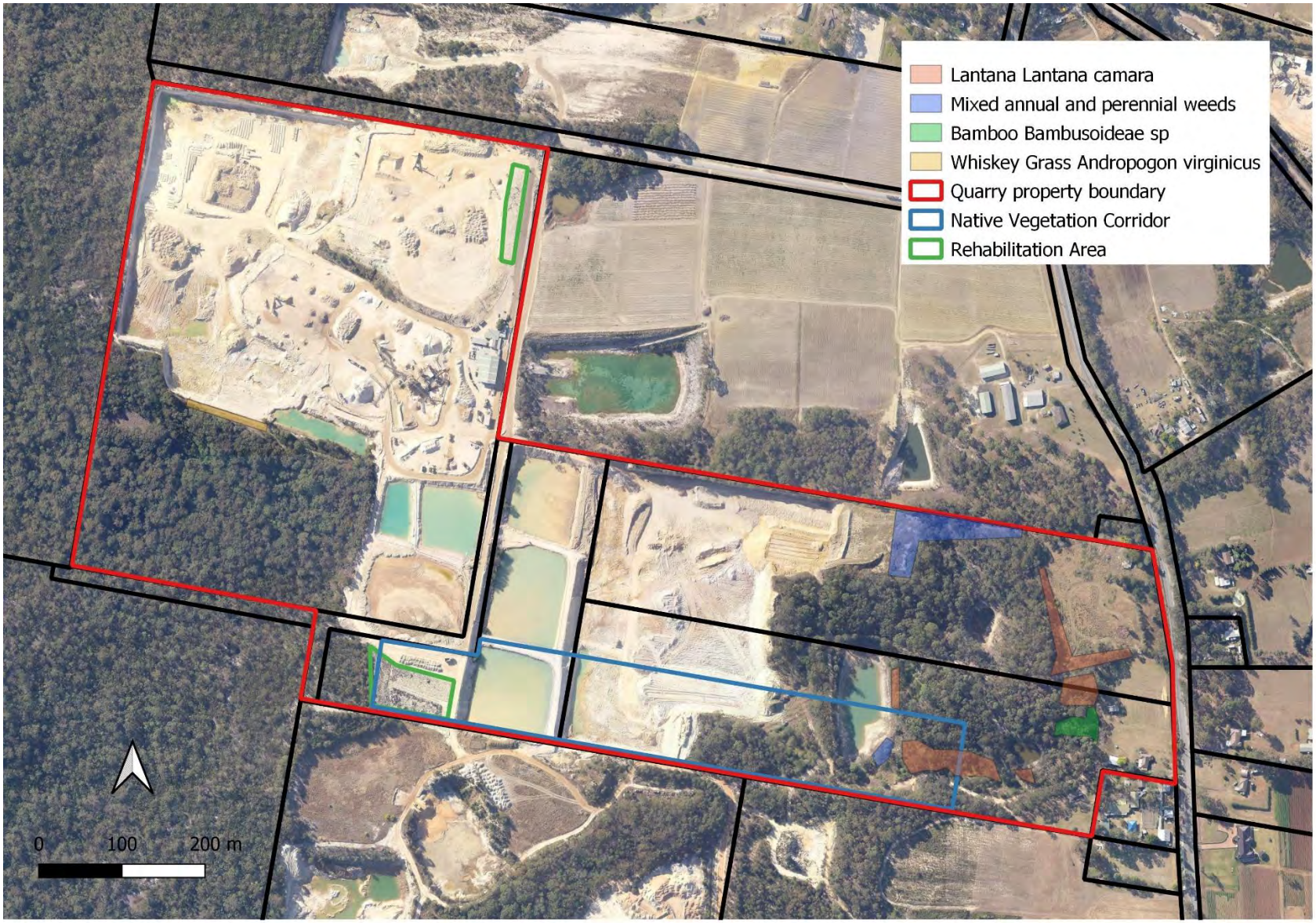


Figure 42. Annual weed distribution map ONR 2021

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3.6 Assessment Against Criteria

The results of the field survey were assessed against the criteria for successful rehabilitation (Table 10).

Table 12. Assessment against criteria to monitor success of rehabilitation

Category	Performance Criteria	Target Achieved	Comments
Native Vegetation	More than 75% of trees are healthy and growing as indicated by long term monitoring	YES	More than 75% of the native vegetation within the active rehabilitation area is healthy and is growing as expected for long term survival. All shrub and ground cover species have reached maturity with flowering and seed production observed. Some species have begun self-propagation within rehabilitation sites. *Eucalyptus, Angophora* and *Corymbia* species have not yet reached maturity.
	More than 50% of translocated or propagated threatened flora species survive as indicated by long term monitoring	YES	More than 50% of translocated and planted propagated threatened flora species has survived despite the dry conditions of the previous reporting period which led into this current reporting period. To date at least 45 propagated *Darwinia fascicularis subsp. Oligantha* and 41 propagated *Melaleuca deanei* have survived transplanting in the rehabilitation area. A complete count of translocated *Darwinia fascicularis subsp. Oligantha* was not undertaken at the time of relocation however it appears that any losses that may have occurred were minimal and new recruits are now visible throughout much of the area.
Vegetation Structure	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities	N/A	At this stage it is too early in the rehabilitation process to determine if the desired vegetation community is being established. Species planted have been specifically chosen to recreate a Banksia Heath community.
Ecosystem Function	Second generation tree seedlings are present or likely to be, based on monitoring comparable older rehabilitation sides (evidence of fruiting of native species observed)	N/A	It is too early in the rehabilitation process for second generation tree seedlings. Fruiting of tree species is not expected for 5 years following the original planting (i.e. 2022).
	Habitat values retained or beginning to develop and improve over time (leaf litter, fallen timber etc)	N/A	Habitat values have been added to the rehabilitation site in the form of logs and vegetation debris. The site is not yet at the age where it will begin to form its own habitat value. This is expected

			to begin between 5-10 years following the original planting. That being said, leaf litter is beginning to form.
Weeds and Pests	Regular inspections indicate a decline weed diversity, density and abundance and a decline in signs of feral animal activity	YES	There were no weed species identified within the rehabilitation area. There are no signs of feral animal activity.
	There is no significant weed infestation such that weeds do not comprise a significant proportion of the species in the stratum	YES	There is no significant weed infestation within the rehabilitation area. Significant weed infestations are located within the NVC outside of the rehabilitation area. These areas are being actively addressed by weed management contractors.
	There is no evidence of significant damage resulting from feral animal activity	YES	There is no evidence of significant damage caused from feral animal activity within the rehabilitation area.

4 DISCUSSION AND RECOMMENDATIONS

This is the fourth Annual Biodiversity and Rehabilitation Management Report produced for Dixon Sand Modification 5. Rehabilitation work is in the early stages and will increase with both intensity and measurable criteria in the years that follow.

This report provides information which will allow for measurable and quantifiable data to be compared over time as the rehabilitation and monitoring continues.

The return of average rainfall over this reporting period has provided ideal growing conditions for the rehabilitation areas of the NVC. Flora within all stratums have increased in size, maturity and density during the past twelve month period. New juvenile recruits are evident from shrub and ground cover species while a slight increase in species diversity was also recorded. Canopy species are growing well and are expected to reach reproductive maturity within the next reporting period.

The remaining vegetation areas within the ONR site have recovered well from the drought conditions of 2018-2019. The return to average rainfall has provided ideal growing conditions for ground cover species, particularly forbs, grasses and ferns. The native vegetation areas with no weedy growth have demonstrated their resilience with no new weed growth or establishment evident following the return to regular rainfall events.

Vegetation within the HRBOA has once again had very little vegetation changes observed throughout the site demonstrating the hardiness of native vegetation stands with minimal historic disturbances.

Threatened species located within the NVC have persisted despite the drought conditions of 2017-2019. The *Kunzea rupestris* was adversely impacted by the drought, particularly from radiant heat reflection from the surrounding sandstone. Although the species is well suited to enduring dry seasons and limited water resources some losses did occur to individuals within the population. New juvenile recruitment is evident thanks to the return of average rainfall with further recruitment likely over the next reporting period. All other threatened species previously recorded onsite were located and appear healthy.

Weed species, particularly *Lantana camara*, within the NVC and 250m school buffer area of the Old Northern Road site should remain a priority management species for removal and control over the next twelve month period. Management of the species has commenced by the bush regeneration contractors however removal of the dead canes should take place to allow native species rehabilitation in these areas. Without management this species is likely to spread over a larger area, in turn supporting habitat for exotic fauna species such as the European Rabbit and the European Red Fox. Suitable techniques for removal have been provided in appendix F.

Rehabilitation efforts have continued in earnest with native plant relocation, propagation and planting taking place throughout the reporting period. Continued propagation of threatened species will persist and supplementary planting within the rehabilitation area will continue.

A silt pond is currently being rested immediately to the east of the rehabilitation areas. This silt pond will form the next new rehabilitation area although it may not be ready to commence with rehabilitation over the next twelve month period. During the next twelve months native rehabilitation work will continue along the western embankment at the front entrance to the quarry site, further clone *Melaleuca deanei* will be planted within the existing rehabilitation site and weed treatment and control will continue throughout the site.

5 LIMITATIONS AND ASSUMPTIONS

This study was limited by the timing and frequency of the survey. There may be flora and/or fauna species present at the site that were not recorded due to their seasonal, territorial or cryptic nature.

It can never be proven that threatened species have not, do not or will not use the site as habitat. The conclusions drawn in this report are a result of testing, observation and experience.

This report describes the habitat and vegetation of the site at the time of the field survey. Vegetation and habitat will change over time and therefore the findings of this report are only relevant for the current proposal and for the duration of the application.

6 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR AND FIELD ECOLOGIST

The Author and Field Ecologist, Melissa Mass, has formal qualifications including a Bachelor of Applied Science (B. App. Sc.), majoring in Ecology, and a Certificate 3 in Horticulture. Her current Scientific Licence number issued from the NSW OEH is SL101441 with expiry date 31st Oct 2023. Furthermore an Animal Research Authority issued by the NSW Animal Care and Ethics Committee is current to undertake general survey work in THSC local government area with expiry 23rd Mar 2023. Melissa is an accredited Biodiversity Assessor conforming to the requirements as imposed by OEH with Accreditation number being BAAS18053.

Melissa has been working as an Ecologist for 13 years. Her work has included targeted threatened species assessment and management, reviews of environmental factors, bush regeneration, environmental impact assessments, and environmental survey and monitoring.

Melissa has a strong focus on threatened species ecology and has actively contributed to the Long-nosed Potoroo National Recovery Plan.

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8 APPENDIX

APPENDIX A – FLORA SPECIES IDENTIFIED WITHIN THE ONR STUDY AREA

Status	Botanical Name	Common Name	Plot 1	Plot 2	Plot 3	Plot 4
	Acacia linifolia	White Wattle	*			*
	Acacia parramattensis	Parramatta Wattle	*		*	
	Acacia suaveolens	Sweet Wattle	*	*		
	Acacia ulicifolia	Prickly Moses	*			*
	Actinotus minor	Lesser Flannel Flower	*	*		*
HTW	*Ageratina adenophora*	Crofton Weed			*	
	Allocasuarina littoralis	Black She-oak	*	*	*	*
HTW	*Andropogon virginicus*	Whiskey Grass			*	
	Angophora bakeri	Narrow-leaved Apple	*			*
	Angophora costata	Smooth Barked Apple		*		*
	Aristida vagans	Threeawn Speargrass	*	*		
	Aristida warburgii	Fine Leaf Wire Grass	*	*		
WoNS HTW	*Asparagus asparagoides*	Bridal Creeper			*	
	Austrostipa pubescens	Spear Grass	*	*		
	Banksia spinulosa	Hairpin Banksia	*			*
HTW	*Bidens pilosa*	Cobblers Pegs			*	
	Billardiera scandens	Hairy Apple Berry	*	*		*
	Bossiaea heterophylla	Variable Bossiaea			*	*
	Bossiaea obcordata	Spiny Bossiaea	*	*		*
	Breynia oblongifolia	Coffee Bush			*	
	Cassytha glabella	Slender Devils Twine	*	*		*
W	*Centaurium erythraea*	Common Centaury			*	
	Ceratopetalum gummiferum	NSW Christmas Bush		*		*
W	*Cirsium vulgare*	Spear Thistle			*	
W	*Conyza bonariensis*	Flax-leaf Fleabane			*	
	Corymbia gummifera	Red Bloodwood	*	*		*
	Cyathochaeta diandra	Sheath Rush				*
W	*Cynodon dactylon*	Couch Grass			*	
	Desmodium varians	Slender Tick Tre-foil	*			
	Dianella caerulea var. product	Blue Flax Lily	*	*		*
	Dianella prunina	Native Flax Lily				*
	Dillwynia retorta	Heathy Parrot Pea				*
	Dodena viscosa	Sticky Hop Bush	*			
	Drosera peltata	Sundew				*
	Einadia hastata	Berry Saltbush			*	
	Entolasia marginata	Bordered Panic	*			
	Entolasia stricta	Wiry Panic	*	*		*
	Epacris pulchella	Wallum Heath	*	*		
	Eragrostis brownii	Brown's Lovegrass	*	*		
	Eucalyptus haemastoma	Scribbly Gum	*			

	Eucalyptus pilularis	Blackbutt				*
	Eucalyptus piperita	Sydney Peppermint		*		*
	Eucalyptus punctata	Grey Gum	*	*		
	Exocarpos cupressiformis	Cherry Ballart				*
	Glochidion ferdinandi	Cheese Tree			*	
	Gonocarpus teucrioides	Raspwort	*	*		
	Goodenia rotundifolia	Star Goodenia		*		
	Grevillea buxifolia	Grey Spider Flower	*	*		
	Grevillea mucronulata	Green Spider Flower		*		
	Grevillea speciosa	Red Spider Flower	*			
	Hakea dactyloides	Broad Leaved Hakea	*			
	Hakea sericea	Needlebush	*	*		*
	Hardenbergia violacea	False Sarsaparilla	*	*		
	Hibbertia aspera	Rough Guinea Flower				*
	Hovea linearis	Common Hovea	*	*		*
	Imperata cylindrica	Blady Grass	*	*	*	
	Indigofera australis	Australian Indigo				*
	Jacksonia scoparia	Dogwood	*			
	Kunzea ambigua	Tickbush		*		
	Lambertia formosa	Mountain Devil	*			*
WoNS HTW	*Lantana camara*	Lantana			*	
	Leptospermum polygalifolium	Tantoon		*		
	Leucopogon juniperinus	Prickly-beard Heath				*
	Leucopogon parviflorus	Coastal Beard-heath				*
	Lindsaea microphylla	Lacy Wedge Fern		*		*
	Lomandra brevis	Tufted Mat-rush		*		*
	Lomandra filiformis	Wattle Mat-rush	*	*		
	Lomandra gracilis	Lomandra gracilis				*
	Lomandra longifolia	Spiny-headed Mat-rush	*	*	*	
	Lomandra multiflora	Many Flowered Mat-rush	*	*		*
	Lomandra obliqua	Fish Bones	*	*		*
	Lomatia silaifolia	Crinkle Bush	*			*
	Microlaena stipoides	Weeping Grass		*		*
W	*Nephrolepis cordifolia*	Fishbone Fern			*	
W	*Oxalis corniculata*	Creeping Woodsorrel			*	
	Ozothamnus diosmifolius	Rice Flower	*	*		*
W	*Pennisetum villosum*	Foxtail Grass			*	
	Persoonia levis	Broad Leaved Geebung	*	*		*
	Persoonia pinifolia	Pine-leaved Geebung	*			*
	Petrophile pulchella	Conesticks	*	*		*
	Phyllanthus hirtellus	Thyme Spurge	*	*		*
W	*Phytolacca octandra*	Inkweed			*	
V	*Pimelea curviflora var. Curviflora*	Pimelea curviflora var. curviflora	*			
	Pimelea linifolia	Slender Rice Flower	*			
W	*Plantago lanceolata*	Plantain			*	
	Platysace linearifolia	Carrot Tops		*		*

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W	*Poa annua*	Annual Poa			*	
	Pomax umbellata	Pomax	*			
	Pratia purpurascens	Whiteroot	*	*		
	Pteridium esculentum	Bracken Fern	*	*		*
	Pultenaea flexilis	Graceful Bush Pea	*	*		
	Rytidosperma racemosum	Wallaby Grass	*			*
	Scaevola ramosissima	Purple Fan-flower		*		*
WoNS HTW	*Senecio madagascariensis*	Fireweed			*	
	Smilax glyciphylla	Sweet Sarsaparilla		*		*
W	*Solanum mauritianum*	Wild Tobacco			*	
W	*Solanum nigrum*	Black Nightshade			*	
	Sporobolus elongatus	Slender Rats Tailed Grass			*	
	Stephania japonica	Snake Vine			*	
	Stylidum lineare	Slender Trigger Grass		*		
V	*Tetratheca glandulosa*	Glandular Pink Bells	*			
	Tetratheca thymifolia	Black Eyed Susan				*
	Themeda australis	Kangaroo Grass	*	*		
	Trema tomentosa var. aspera	Native Peach			*	
W	*Trifolium dubium*	Yellow Suckling Clover			*	
W	*Verbena bonariensis*	PurpleTop			*	
	Veronica plebeia	Trailing Speedwell			*	
W	*Vicia sativa*	Common Vetch			*	
	Xanthorrhoea resinosa	Grass Tree	*	*		*
	Xanthosia pilosa	Woolly Xanthosia		*		*
	Xanthosia tridentata	Rock Xanthosia		*		
	Xylomelum pyriforme	Woody Pear				*

V – Vulnerable Species , **W** – Weed , **WoNS** – Weed of National Significance , **HTW** – High Threat Weed

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APPENDIX B – FLORA SPECIES IDENTIFIED WITHIN ONR REHABILITATION AREA

Status	Botanical Name	Common Name	Rehab 1	Translocate	Soil seedbank
En	*Acacia byoneana*	Byone's Wattle	Seed bank		
	Acacia linifolia	White Wattle	Seed bank	*	*
	Acacia myrtifolia	Red-stemmed Wattle	Seed bank	*	*
	Acacia parramattensis	Parramatta Wattle	Seed bank	*	*
	Acacia suaveolens	Sweet Wattle	Planted	*	*
	Acacia ulicifolia	Prickly Moses	Planted	*	*
	Actinotus minor	Lesser Flannel Flower	Seed bank	*	*
	Allocasuarina littoralis	Black She-oak	Planted	*	*
HTW	*Andropogon virginicus*	Whiskey Grass		*	
	Angophora bakeri	Narrow-leaf Apple	Seed bank	*	
	Angophora costata	Smooth Barked Apple	Planted		
	Angophora hispida	Dwarf Apple	Planted	*	*
	Anisopogon avenaceus	Oat Spear Grass	Seed bank	*	*
	Aristida vagans	Threeawn Speargrass	Planted	*	*
	Aristida warburgii	Fine-leafed Wire Grass		*	
	Asplenium trichomanes	Common Spleenwort		*	*
	Austrostipa pubescens	Spear Grass	Seed bank	*	*
	Banksia ericifolia	Heath-leaved Banksia	Planted	*	*
	Banksia serrata	Old Man Banksia	Planted	*	*
	Banksia spinulosa	Hairpin Banksia	Planted	*	
	Billardiera scandens	Hairy Apple Berry	Seed bank	*	*
	Boronia floribunda	Pale Pink Boronia	Seed bank	*	*
	Boronia ledifolia	Sydney Boronia	Seed bank	*	*
	Bossiaea heterophylla	Variable Bossiaea	Seed bank	*	*
	Bossiaea obcordata	Spiny Bossiaea	Planted	*	
	Calytrix tetragona	Common Fringe Myrtle	Planted	*	
	Cassytha glabella	Slender Devils Twine	Seed bank	*	*
	Caustis pentandra	Curly Wig	Seed bank	*	
	Cheilanthes seiberi	Mulga Fern	Seed bank	*	*
	Corymbia eximia	Yellow Bloodwood	Planted		
EnP	*Darwinia fascicularis subsp. oligantha*		Planted	Planted	Planted
	Dianella caerulea	Blue-flax Lily	Seed bank	*	
	Dianella prunina	Native Flax Lily	Planted	*	
	Dichelachne inaequiglumis	Short-hair Plume Grass		*	
	Dillwynia floribunda	Showy Parrot Pea	Seed bank		
	Dillwynia retorta	Parrot Pea	Seed bank	*	*
	Echinopogon caespitosus	Bushy Hedgehog Grass	Planted		
	Entolasia marginata	Bordered Panic	Planted		
	Entolasia stricta	Wiry Panic	Seed bank	*	*
	Epacris microphylla	Coral Heath		*	
	Epacris pulchella	Wallum Heath	Seed bank	*	*
	Eragrostis brownii	Brown's Lovegrass	Seed bank	*	*
	Eucalyptus haemastoma	Scribbly Gum	Planted	*	
	Eucalyptus punctata	Grey Gum	Seed bank		
	Eucalyptus tereticornis	Forest Redgum	Planted		

	Gahnia sieberiana	Red-fruit Saw-sedge		*	
	Gompholobium grandiflorum	Large Wedge Pea	Seed bank	*	*
	Gonocarpus teucrioides	Raspwort	Planted	*	*
	Goodenia hederacea	Forest Goodenia	Planted	*	*
	Grevillea buxifolia	Grey Spider Flower	Planted	*	*
	Grevillea mocronulata	Green Spider Flower			*
	Grevillea sericea	Pink Spider Flower	Planted		
	Grevillea speciosa	Red Spider Flower	Planted	*	*
	Hakea sericea	Needlebush	Planted	*	*
	Hardenbergia violacea	False Sarsparilla	Seed bank	*	*
	Hibbertia aspera	Rough Guinea Flower	Planted		
	Hibbertia diffusa	Wedge Guinea Flower	Planted		*
	Hovea linearis	Common Hovea	Seed bank	*	
	Imperata cylindrica	Blady Grass	Seedbank	*	*
	Isopogon anemonifolius	Broad-leaved Drumsticks	Planted	*	*
	Juncus usitatus	Common Rush		*	
	Kunzea ambigua	Tick Bush			*
	Kunzea capitata	Pink Kunzea	Planted		
	Laxmannia gracilis	Slender Wire Lily	Seed bank	*	*
	Leptospermum trinervium	Flaky-barked Tea-tree	Planted	*	*
	Leucopogon juniperinus	Prickly-beard Heath	Planted		
	Leucopogon microphyllus	Small-leaved White Beard		*	*
	Lomandra brevis	Tufted Mat-rush	Seed bank	*	
	Lomandra glauca	Pale Mat-rush		*	*
	Lomandra longifolia	Spiny-headed Mat-rush	Planted	*	*
	Lomandra multiflora	Many Flowered Mat-rush	Seed bank	*	*
	Lomandra obliqua	Fishbones	Seed bank	*	*
	Lomatia silaifolia	Crinkle Bush	Seed bank		
V	*Melaleuca deanei*	Deane's Paperbark	Planted	Planted	Planted
	Microlaena stipoides	Weeping Grass	Seed bank	*	
	Micromyrtus ciliata	Fringed Heath Myrtle		*	
	Mirbelia rubiifolia	Heath Mirbelia	Seed bank	*	*
	Mirbelia speciosa	Mirbelia	Seed bank		
	Patersonia sericea	Purple Flag Flower	Seed bank	*	*
	Persoonia pinifolia	Pine-leaved Geebung	Seed bank	*	*
	Petrophile pulchella	Conesticks		*	
	Petrophile sessilis	Prickly Conesticks	Planted		
	Phyllanthus hirtellus	Thyme Spurge	Planted	*	*
	Phyllota phylicoides	Heath Phyllota			
	Pimelea linifolia	Slender Rice Flower	Seed bank	*	*
	Platysace linearifolia	Carrot Tops	Seed bank	*	*
	Pteridium esculentum	Bracken Fern	Seed bank	*	
	Rytidosperma racemosum	Wallaby Grass	Seed bank	*	*
	Scaevola ramosissima	Purple Fan Flower	Seed bank	*	
	Schoenus ericetorum	Heath Bog Rush	Seed bank	*	*
	Stylidium graminifolium	Grass Trigger Plant		*	

V	*Tetratheca glandulosa*	Glandular Pink Bells	Seedbank	Translocated	
	Themeda australis	Kangaroo Grass	Seedbank	*	*
	Trema tomentose	Native Peach	Seed bank	*	*

En – Endangered species
EnP – Endangered Population
V – Vulnerable species
HTW – High Threat Weed

APPENDIX C – FLORA SPECIES IDENTIFIED AT HRBOA

Status	Botanical Name	Common Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
	Acacia hispidula	Little Harsh Acacia		*	*		
	Acacia linearifolia	Narrow-leaved Wattle				x	
	Acacia linifolia	White Wattle	*	*	*		
	Acacia suaveolens	Sweet Wattle	*	*	*		
	Acacia terminalis	Sunshine Wattle	*				
	Acacia ulicifolia	Prickly Moses	*				*
	Actinotus helianthi	Flannel Flower					*
	Actinotus minor	Lesser Flannel Flower	*	*	*		*
	Allocasuarina distyla	Scrub She-oak		*			
	Allocasuarina littoralis	Black She-oak	*			*	*
	Angophora costata	Smooth Barked Apple	*			*	
	Angophora hispida	Dwarf Apple					*
	Aristida vagans	Threeawn Speargrass		*			*
	Aristida warburgii	Fine-leafed Wire Grass		*		*	
	Asplenium trichomanes	Common Spleenwort		*		*	*
	Austrostipa pubescens	Spear Grass	*	*	*	*	*
	Banksia ericifolia	Heath-leaved Banksia	*	*	*		*
	Banksia oblongifolia	Fern-leaved Banksia		*			
	Banksia serrata	Old Man Banksia	*		*		*
	Banksia spinulosa	Hairpin Banksia	*	*	*	*	
	Billardiera scandens	Hairy Apple Berry	*	*	*	*	*
	Boronia floribunda	Pale Pink Boronia	*		*	*	*
	Boronia ledifolia	Sydney Boronia	*	*			*
	Bossiaea hetrophylla	Variable Bossiaea		*			*
	Bossiaea lenticularis	Bossiaea	*		*	*	
	Bossiaea scolopendra	Sword Bossiaea	*	*			*
	Callicoma serratifolia	Black Wattle				*	
	Calochlaena dubia	Soft Braken Fern			*		
	Calytrix tetragona	Common Fringe Myrtle		*			
	Cassytha glabella	Slender Devils Twine	*	*	*	*	*
	Carex inversa	Knob Sedge				*	*
	Caustis flexuosa	Curly Wig	*	*	*	*	*
	Caustis pentandra	Thick Twist Rush		*			
	Ceratopetalum gummiferum	NSW Christmas Bush	*		*	*	
	Cheilanthes seiberi	Mulga Fern		*	*	*	*
	Corymbia eximia	Yellow Bloodwood			*		
	Corymbia gummifera	Red Bloodwood	*		*	*	
	Cyathochaeta diandra	Sheath Rush	*			*	*
	Cymbidium sp	Orchid				*	
V	*Darwinia biflora*			*			
	Dianella caerulea var. producta	Blue Flax Lily	*	*	*	*	
	Dianella prunina						*
	Dillwynia floribunda		*				*
	Dillwynia retorta	Parrot Pea		*			*
	Dodonaea viscosa	Sticky Hop Bush			*	*	
	Dracophyllum secundum	Dracophyllum	*		*	*	

	Drosera auriculata	Sundew	*	*	*	*	*
	Elaeocarpus reticulatus	Blueberry Ash				*	
	Entolasia stricta	Wiry Panic	*	*	*	*	*
	Epacris microphylla	Coral Heath		*			
	Epacris pulchella	Wallum Heath	*	*	*	*	*
	Eucalyptus haemastoma	Scribbly Gum		*			*
	Eucalyptus pilularis	Blackbutt	*				
	Eucalyptus piperita	Sydney Peppermint			*		
	Eucalyptus punctata	Grey Gum			*		*
	Eucalyptus resinifera	Red Mahogony				*	
	Gahnia sieberiana	Red-fruit Saw-sedge				*	
	Gonocarpus teucrioides	Raspwort	*				*
	Gompholobium glabratum	Dainty Wedge Pea		*		*	*
	Gompholobium latifolium	Golden Glory Pea				*	
	Grevillea buxifolia	Grey Spider Flower	*				*
	Grevillea speciosa	Red Spider-flower	*	*	*		*
	Hakea dactyloides	Broad-leaved Hakea		*			*
	Hakea propinqua	Large Fruit Hakea		*			
	Hakea sericea	Needlebush		*		*	
	Hibbertia aspera	Rough Guinea Flower			*		*
	Hovea linearis	Common Hovea			*		*
	Imperata cylindrica	Blady Grass				*	*
	Isopogon anemonifolius	Broad-leaved Drumsticks	*		*		*
	Lambertia formosa	Mountain Devil	*	*	*	*	*
	Lepidosperma laterale	Variable Swordsedge		*		*	
	Leptospermum polygalifolium	Tantoon			*		
	Leptospermum trinervium	Flaky-barked Tea-tree	*	*	*	*	*
	Leucopogon ericoides					*	
	Leucopogon juniperinus	Prickly-beard Heath					*
	Leucopogon microphyllus	Small Leaved White Beard		*	*		
	Lindsaea microphylla	Lacy Wedge Fern			*	*	
	Lomandra brevis	Tufted Mat-rush	*	*	*	*	*
	Lomandra filiformis	Wattle Mat-rush			*	*	
	Lomandra glauca	Pale Mat-rush	*	*	*		*
	Lomandra gracilis	Small Lomandra					*
	Lomandra longifolia	Spiny-headed Mat-rush				*	*
	Lomandra multiflora	Many Flowered Mat-rush	*	*	*	*	*
	Lomandra obliqua	Fish Bones	*	*	*	*	*
	Lomatia silaifolia	Crinkle Bush	*	*	*	*	*
	Micrantheum ericoides			*			
	Micromyrtus ciliata	Fringed Heath-myrtle					*
	Mirbelia rubiifolia	Heath Mirbelia		*			
	Patersonia sericea	Purple Flag Flower	*	*			
	Persoonia lanceolate	Lance Leaf Geebung	*				*

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	Persoonia levis	Broad Leaved Geebung		*	*	*	*
	Persoonia pinifolia	Pine-leaved Geebung	*	*	*	*	*
	Petrophile pulchella	Conesticks	*	*			*
	Phyllanthus hirtellus	Thyme Spurge	*	*	*	*	*
	Phyllota phylicoides	Heath Phyllota		*			
	Pimelea linifolia	Slender Rice Flower	*		*	*	*
	Platysace linearifolia	Carrot Tops	*	*	*	*	*
	Pomax umbellata	Pomax			*		
	Pratia purpurascens	Whiteroot			*		
	Pteridium esculentum	Bracken Fern	*	*	*	*	
	Rytidosperma racemosum	Wallaby Grass		*		*	
	Scaevola ramosissima	Purple Fan-flower			*		
	Schoenus melanostachys	Black Bog Rush	*				*
	Smilax glyciphylla	Sweet Sarsaparilla	*		*	*	
	Stylidium graminifolium	Grass Trigger Plant	*		*	*	
	Telopea speciosissima	NSW Waratah				*	
	Tetratheca thymifolia					*	
	Themeda australis	Kangaroo Grass					*
	Xanthorrhoea resinosa	Grass Tree	*	*	*	*	*
	Xanthosia pilosa	Woolly Xanthosia	*			*	*
	Xanthosia tridentata	Rock Xanthosia		*	*		
	Xylomelum pyriforme	Woody Pear				*	

V – Vulnerable species

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APPENDIX D – FAUNA SPECIES IDENTIFIED WITHIN ONR SURVEY AREA

	Scientific Name	Common name	Method of observation
BIRDS			
	Anthochaera chrysoptera	Little Wattlebird	On site observation
	Aquila audax	Wedge-tailed Eagle	Flying above
V	*Calyptorhynchus lathami*	Glossy Black Cockatoo	On site observation
	Colluricincla harmonica	Grey Shrike-thrush	On site observation
	Cracticus tibicen	Australian Magpie	On site observation
	Cracticus torquatus	Grey Butcherbird	On site observation
	Dacelo novaeguineae	Laughing Kookaburra	On site observation
	Eopsaltria australis	Eastern Yellow Robin	On site observation
	Falco cenchroides	Nankeen Kestral	Flying above
	Lichenostomus leucotis	White-eared Honeyeater	On site observation
	Leucosarcia melanoleuca	Wonga Pigeon	On site observation
	Malurus cyaneus	Superb Fairy Wren	On site observation
	Manorina melanocephala	Noisy Minor	On site observation
	Meliphaga lewinii	Lewin's Honeyeater	On site observation
	Melithreptus brevirostris	Brown-headed Honeyeater	On site observation
	Neochmia temporalis	Red-browed Finch	On site observation
	Pardalotus punctatus	Spotted Pardalote	On site observation
	Phylidonyris novaehollandiae	New Holland Honeyeater	On Site observation
	Rhipidura albiscapa	Grey Fantail	On site observation
	Rhipidura leucophrys	Willie Wagtail	On site observation
	Sericornis frontalis	White-browed scrubwren	On site observation
	Strepera graculina	Pied Currawong	On site observation
MAMMALS			
	Austronomus australis	White-striped Free-tailed Bat	AnaBat Express
P	*Canis lupus familiaris*	Dog	Sand pad
	Chalinolobus gouldii	Gould's Wattled Bat	AnaBat Express
	Chalinolobus morio	Chocolate Wattled Bat	AnaBat Express
P	*Felis catus*	Domestic Cat	Sand pad
V	*Micronomus norfolkensis*	Eastern Free-tailed Bat	AnaBat Express
V	*Miniopterus australis*	Little Bent-winged Bat	AnaBat Express
	Perameles nasuta	Long-nosed Bandicoot	Digs
P	*Oryctolagus cuniculus*	European Rabbit	Scat/digs/sand pad
	Ozimops ridei	Ride's Free-tailed Bat	AnaBat Express
	Rhinolophus megaphyllus	Eastern Horseshoe Bat	AnaBat Express
	Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	AnaBat Express
	Trichosurus vulpecula	Brush-tailed Possum	Scat
	Vespadelus pumilus	Eastern Forest Bat	AnaBat Express
P	*Vulpes vulpes*	European Red Fox	Scat/Sand pad
	Wallabia bicolor	Swamp Wallaby	On site observation/scat/ Sand pad
AMPHIBIANS			

	Crinia signifera	Common Eastern Froglet	Heard at farm dam
	Litoria peronei	Peron's Tree Frog	Heard in distance
REPTILES			
	Ctenotus robustus	Eastern Striped Skink	On site observation
	Lampropholis guichenoti	Common Garden Skink	On site observation
	Pseudechis porphyriacus	Red-bellied Black Snake	On site observation
	Varanus varius	Lace Monitor	Sand pad

V – Vulnerable species
P – Pest species

APPENDIX E – FAUNA SPECIES IDENTIFIED WITHIN HRBOA SURVEY AREA

	Scientific Name	Common name	Method of observation
BIRDS			
	Acanthorhynchus tenuirostris	Eastern Spinebill	On site observation
	Alisterus scapularis	King Parrot	On site observation
	Anthochaera chrysoptera	Little Wattlebird	On site observation
V	*Calyptorhynchus lathami*	Glossy Black Cockatoo	On site observation
V	*Climacteris picumnus*	Brown Treecreeper	On site observation
	Colluricincla harmonica	Grey Shrike-thrush	On site observation
	Cracticus tibicen	Australian Magpie	On site observation
	Cracticus torquatus	Grey Butcherbird	On site observation
	Dacelo novaeguineae	Laughing Kookaburra	On site observation
	Eopsaltria australis	Eastern Yellow Robin	On site observation
	Falco cenchroides	Nankeen Kestrel	On site observation
	Lichenostomus chrysops	Yellow-faced Honeyeater	On site observation
	Lichenostomus leucotis	White-eared Honeyeater	On site observation
	Leucosarcia melanoleuca	Wonga Pigeon	On site observation
	Macropygia Phasianella	Brown Cuckoo-Dove	On site observation
	Malurus cyaneus	Superb Fairy Wren	On site observation
	Meliphaga lewinii	Lewin's Honeyeater	On site observation
	Neochmia temporalis	Red-browed Finch	On site observation
	Pardalotus punctatus	Spotted Pardalote	On site observation
	Phylidonyris novaehollandiae	New Holland Honeyeater	On site observation
	Platycercus elegans	Crimson Rosella	On site observation
	Platycercus eximius	Eastern Rosella	On site observation
	Ptilonorhynchus violaceus	Satin Bowerbird	On site observation
	Rhipidura albiscapa	Grey Fantail	On site observation
	Rhipidura leucophrys	Willie Wagtail	On site observation
	Rhipidura rufifrons	Rufus Fantail	On site observation
	Sericornis frontalis	White-browed Scrubwren	On site observation
	Strepera graculina	Pied Currawong	On site observation
MAMMALS			
	Austronomus australis	White-striped Free-tailed Bat	AnaBat Express
P	*Canis lupus familiaris*	Dog	Print in sand
V	*Chalinolobus dwyeri*	Large-eared Pied Bat	AnaBat Express
	Chalinolobus gouldii	Gould's Wattled Bat	AnaBat Express
	Chalinolobus morio	Chocolate Wattled Bat	AnaBat Express
	Macropus giganteus	Eastern Grey Kangaroo	Print in sand
V	*Micronomus norfolkensis*	Eastern Free-tailed Bat	AnaBat Express
V	*Miniopterus australis*	Little Bent-winged Bat	AnaBat Express
	Perameles nasuta	Long-nosed Bandicoot	Digs/scats
	Ozimops ridei	Ride's Free-tailed Bat	AnaBat Express
	Rhinolophus megaphyllus	Eastern Horseshoe Bat	AnaBat Express
	Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	AnaBat Express
	Trichosurus vulpecula	Brush-tailed Possum	Scat
	Vespadelus pumilus	Eastern Forest Bat	AnaBat Express

P	*Vulpes vulpes*	European Red Fox	Scat
	Wallabia bicolor	Swamp Wallaby	Scat/prints/Infrared camera
AMPHIBIANS			
	Crinia signifera	Common Eastern Froglet	Heard in distance
	Litoria peronei	Peron's Tree Frog	Heard in distance
REPTILES			
	Ctenotus taeniolatus	Copper-tailed Skink	On site observation
	Lampropholis guichenoti	Common Garden Skink	On site observation
	Pseudechis porphyriacus	Red-bellied Black Snake	On site observation

V – Vulnerable species
P – Pest species

APPENDIX F – MELALUECA DEANEI IN REHABILITATION AREA

ID number	Easting	Northing	Condition	Height	Width
Planted Rehabilitation					
1	312588	6296396	Healthy	1.2m	0.8m
2	312592	6296403	Healthy	1.2m	0.7m
3	312589	6296408	Healthy	0.8m	0.3m
4	312580	6296412	Healthy	1m	0.4m
5	312563	6296403	Healthy	1m	0.4m
6	312560	6296413	Healthy	1m	0.5m
7	312556	6296404	Healthy	0.8m	0.3m
8	312584	6296410	Healthy	1m	0.5m
9	312558	6296418	Healthy	1.5m	0.7m
10	312502	6296414	Healthy	0.9m	0.4m
11	312556	6296422	Healthy	1.2m	0.5m
12	312567	6296416	Healthy	1.2m	0.4m
13	312574	6296396	Healthy	1.4m	0.5m
14	312221	6296241	Healthy	1m	0.3m
Translocated Rehabilitation					
1b	312539	6296391	Planted 2017 Healthy	1m	0.4m
2b	312587	6296378	Planted May 2021	<30cm	<20cm
3b	312582	6296376	Planted May 2021	<30cm	<20cm
4b	312581	6296382	Planted May 2021	<30cm	<20cm
5b	312576	6296379	Planted May 2021	<30cm	<20cm
6b	312575	6296376	Planted May 2021	<30cm	<20cm
7b	312573	6296377	Planted May 2021	<30cm	<20cm
8b	312571	6296385	Planted May 2021	<30cm	<20cm
9b	312564	6296387	Planted May 2021	<30cm	<20cm
10b	312564	6296385	Planted 2017 Healthy	1.2m	0.5m
11b	312562	6296380	Planted May 2021	<30cm	<20cm
12b	312565	6296378	Planted May 2021	<30cm	<20cm
13b	312561	6296383	Planted May 2021	<30cm	<20cm
14b	312549	6296390	Planted May 2021	<30cm	<20cm
15b	312555	6296381	Planted May 2021	<30cm	<20cm
16b	312549	6296385	Planted May 2021	<30cm	<20cm

17b	312545	6296379	Planted May 2021	<30cm	<20cm
18b	312535	6296387	Planted May 2021	<30cm	<20cm
19b	312541	6296392	Planted May 2021	<30cm	<20cm
20b	312547	6296393	Planted May 2021	<30cm	<20cm
21b	312525	6296400	Planted May 2021	<30cm	<20cm
22b	312531	6296408	Planted May 2021	<30cm	<20cm
23b	312537	6296405	Planted May 2021	<30cm	<20cm
24b	312540	6296406	Planted May 2021	<30cm	<20cm
25b	312543	6296406	Planted May 2021	<30cm	<20cm
Seedbank Rehabilitation					
17	312510	6296389	Healthy	2m	0.9m

South East Environmental

APPENDIX G – LANTANA CAMARA MANAGEMENT GUIDE

How to control lantana

Quick reference guide

Lantana – *Lantana camara*

Minimise spread and future impacts

Although lantana is widespread on the east coast of Australia, it is still absent from parts of its potential range. These areas should be protected by:

- preventing the importation of further varieties and species of lantana
- stopping more planting of lantana in gardens
- strategically controlling infestations which threaten uninfested areas.

A control program for dense infestations in pastures

The Queensland Department of Natural Resources and Mines has produced a pest series fact sheet on lantana (PP#34). They advise that herbicides are too expensive to treat large lantana infestations.

A combination of fire and mechanical control makes spot treatment of small patches with herbicides more cost-effective. The following suggested control program for dense infestations in pastures is based on the fact sheet:

1. Exclude stock to allow a fuel load to build up.
2. Bulldoze, stickrake or plough the infestation to add to the fuel load.
3. Burn the infestation after obtaining a permit. Summer burns are more effective than winter burns.
4. Sow an improved pasture. Seek advice of local council or state/territory government agencies for selection of non-weedy pasture species.
5. Continue stock exclusion until pasture has established and set seed.
6. Burn the infestation again after obtaining a permit.
7. Spot spray or grub out any regrowth or seedlings. Spraying is most effective between summer and autumn.
8. Follow-up burning, spraying and/or grubbing will be required for several years.



Lantana can escape from garden plantings into surrounding bushland.
Photo: Tim Schultz



Control options

Type of infestation	Physical	Mechanical	Chemical	Fire	Biological
Small (few plants, small area)	Hand grubbing only suitable for seedlings. Wear gloves for protection from thorns.	Not suitable.	Spot spray plants less than 2 m in height between summer and autumn with a registered herbicide.	Not suitable.	There are four useful biological control agents. They are already distributed throughout their potential range.
Medium (medium density, medium total area)		Bulldoze, plough, stick-rake or slash infestations. Soil disturbance will lead to mass seed germination, so follow up with further controls. Do not use mechanical control in areas susceptible to erosion. A permit may be required.	Spraying is uneconomical for medium or large infestations. Helicopter spraying is used when there is no access for mechanical control, eg very steep slopes.	Under permit, burn in summer with good fuel load of grass and/or mechanically cleared lantana. Also use as follow-up. Do not burn in rainforests.	
Large (many plants, many ha)					

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CRC Weed management

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South East Environmental

End

Of

Report

South East Environmental

Appendix I – S94 Contribution

DIXON SAND

SECTION 94 CONTRIBUTION

JULY 2020

1	1,785.26
2	1,380.14
3	1,293.24
4	321.16
6	1,265.99
7	1,451.32
8	1,387.35
9	1,529.96
10	1,143.04
11	248.06
13	1,302.74
14	638.49
15	1,238.86
16	1,414.43
17	1,090.70
18	336.94
20	1,582.24
21	1,520.80
22	1,315.28
23	1,434.50
24	1,476.66
25	270.12
27	788.10
28	553.70
29	822.57
30	1,238.28
31	1,201.18

30,031.11 Tonnes @ $1.05

$31,532.67

Dixon Sand Pty Ltd ABN 80 002 278 686
Quarry: 4610 Old Northern Road, Maroota, NSW 2756. Ph. (02) 4566 8348
Postal Address: P.O. Box 4019, Pitt Town NSW 2756
Website: www.dixonsand.com.au

DIXON SAND

SECTION 94 CONTRIBUTION

AUGUST 2020

1	365.96
3	1,432.38
4	1,499.11
5	1,445.84
6	1,492.28
7	1,317.84
8	156.04
10	645.66
11	1,076.45
12	1,168.45
13	1,454.62
14	1,786.89
15	211.88
17	1,767.90
18	1,607.90
19	1,024.63
20	1,414.96
21	1,415.64
22	385.48
24	1,504.00
25	1,561.12
26	1,782.76
27	1,784.62
28	1,626.02
29	561.74
31	1,817.66

32,307.83 Tonnes @ $1.04

$33,600.14

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DIXON SAND

SECTION 94 CONTRIBUTION

SEPTEMBER 2020

1	1,529.26
2	1,840.16
3	1,767.94
4	1,460.26
5	410.42
7	1,867.82
8	1,817.04
9	1,333.88
10	1,359.42
11	1,756.84
12	366.72
14	1,682.12
15	1,578.06
16	1,427.18
17	1,836.26
18	1,571.56
19	445.22
21	1,668.80
22	1,840.25
23	1,324.10
24	1,504.55
25	1,653.90
26	568.36
28	1,595.12
29	1,832.66
30	1,847.56

37,885.46 Tonnes @ $1.04

$39,400.88

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DIXON SAND

SECTION 94 CONTRIBUTION

OCTOBER 2020

1	2,134.79
2	2,193.71
3	480.76
6	1,722.50
7	1,338.28
8	1,092.26
9	1,599.32
10	508.24
12	1,820.08
13	1,788.76
14	1,553.70
15	1,716.04
16	1,606.03
17	671.60
19	1,714.56
20	2,076.96
21	2,107.96
22	1,740.86
23	1,754.54
24	403.02
26	956.50
27	781.30
28	1,133.70
29	791.84
30	910.75
31	76.54

34,674.60 Tonnes @ $1.04

$36,061.58

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Postal Address: P.O. Box 4019, Pitt Town NSW 2756
Website: www.dixonsand.com.au

DIXON SAND

SECTION 94 CONTRIBUTION

NOVEMBER 2020

2	1,655.46
3	1,484.77
4	1,886.32
5	1,302.96
6	1,095.10
7	212.12
9	1,826.21
10	1,745.05
11	2,344.78
12	2,011.36
13	1,744.36
14	585.66
16	1,896.94
17	1,618.02
18	1,595.10
19	1,802.08
20	1,529.76
21	247.10
23	2,169.48
24	1,677.30
25	1,721.50
26	2,810.91
27	1,606.70
28	612.76
30	1,974.52

39,156.32 Tonnes @ $1.04

$40,722.57

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DIXON SAND

SECTION 94 CONTRIBUTION

DECEMBER 2020

1	2,195.09
2	1,634.16
3	1,754.12
4	1,787.91
5	759.22
7	2,270.83
8	1,955.42
9	2,222.02
10	2,236.37
11	2,148.18
12	597.06
14	2,213.28
15	2,167.01
16	2,026.92
17	2,167.10
18	1,700.73
19	520.02
21	2,370.14
22	1,757.85
23	1,047.78

35,531.21 Tonnes @ $1.04

$36,952.46

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DIXON SAND

SECTION 94 CONTRIBUTION

JANUARY 2021

4	1,033.56
5	1,549.42
6	1,312.47
7	1,502.78
8	1,761.94
9	294.20
11	3,004.25
12	2,373.39
13	2,579.63
14	2,064.26
15	2,362.33
16	704.22
18	2,003.48
19	1,576.45
20	1,606.52
21	1,985.14
22	1,437.74
23	493.88
25	1,118.22
27	1,408.96
28	1,476.48
29	1,399.04
30	355.04

35,403.40 Tonnes @ $1.04

$36,819.54

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DIXON SAND

SECTION 94 CONTRIBUTION

FEBRUARY 2021

1	1,371.45
2	1,555.78
3	1,409.84
4	1,317.42
5	1,571.08
6	840.80
8	1,407.41
9	1,731.19
10	1,639.25
11	2,255.92
12	1,801.85
13	426.98
15	1,877.77
16	1,382.87
17	1,247.76
18	1,432.36
19	1,222.10
20	352.12
22	2,589.88
23	1,873.73
24	1,554.61
25	1,763.58
26	1,392.66
27	649.20

34,667.61 Tonnes @ $1.04

$36,054.31

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DIXON SAND

SECTION 94 CONTRIBUTION

MARCH 2021

1	1,799.22
2	1,877.80
3	1,798.65
4	1,954.12
5	1,937.88
6	670.50
8	2,071.28
9	1,714.92
10	1,950.33
11	1,823.19
12	2,278.26
13	610.21
15	1,959.21
16	2,026.23
17	1,753.52
18	1,252.74
19	356.80
20	39.04
22	300.66
23	19.84
24	173.50
25	955.08
26	851.04
27	290.82
29	1,274.36
30	1,444.84
31	1,964.21

35,148.25 Tonnes @ $1.04

$36,554.18

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DIXON SAND

SECTION 94 CONTRIBUTION

SAND & SANDSTONE SALES
APRIL 2021

1	1,787.44
6	2,214.05
7	1,846.21
8	1,571.98
9	1,753.75
10	571.30
12	1,934.88
13	2,364.50
14	2,104.55
15	1,762.00
16	2,825.80
17	494.30
19	1,689.03
20	1,521.52
21	2,036.15
22	1,702.21
23	1,355.33
24	643.71
26	1,731.00
27	1,596.56
28	1,742.66
29	1,923.16
30	1,860.30

39,032.39 Tonnes @ $1.04

$40,593.69

Dixon Sand Pty Ltd ABN 80 002 278 686
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DIXON SAND

SECTION 94 CONTRIBUTION

SAND & SANDSTONE SALES
MAY 2021

1	849.76
3	1,646.28
4	1,561.31
5	1,235.18
6	908.97
7	724.66
8	415.10
10	1,352.26
11	1,208.68
12	1,683.16
13	1,654.70
14	1,539.53
15	663.90
17	2,129.95
18	1,962.97
19	1,613.30
20	1,846.02
21	1,717.67
22	709.25
24	2,065.18
25	1,953.53
26	1,655.90
27	1,334.43
28	1,809.46
29	768.70
31	1,838.71

36,848.56 Tonnes @ $1.04

$38,322.50

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DIXON SAND

SECTION 94 CONTRIBUTION

SAND & SANDSTONE SALES
JUNE 2021

1	1,711.52
2	1,506.68
3	1,687.26
4	1,350.17
5	543.90
7	1,431.67
8	1,504.84
9	1,646.53
10	1,660.49
11	1,416.06
12	394.74
15	1,638.62
16	1,826.68
17	1,845.30
18	1,629.82
19	397.86
21	1,593.42
22	1,454.20
23	1,454.57
24	1,677.62
25	1,420.12
26	841.28
28	1,445.84
29	1,369.17
30	1,810.65

35,259.01 Tonnes @ $1.04

$36,669.37

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Quarry: 4610 Old Northern Road, Maroota, NSW 2756. Ph. (02) 4566 8348
Postal Address: P.O. Box 4019, Pitt Town NSW 2756
Website: www.dixonsand.com.au

Appendix J – Community Engagement and CCC Meeting Minutes

Dixon Sand (Penrith) Pty Ltd

MINUTES OF THE BI-ANNUAL COMMUNITY CONSULTATIVE COMMITTEE 11 NOVEMBER 2020 GLENORIE RSL CLUB - GLENORIE

	NAME	ORGANISATION
PRESENT	Lisa Andrews (LA)	Independent Chairperson
	Kristine McKenzie (KM)	The Hills Shire Council Representative
	Daniel Giffney (DG)	The Hills Shire Council Representative
	Pat Schwartz (PS)	Community Representative *(left at 2.20pm)*
	Farley Roberts (FR)	Community Representative
	Timothy Baker (TB)	Bush Regeneration Contractor (Bush-It)
	Hunny Churcher (HC)	Environmental Officer, Dixon Sand
	David Dixon (DD)	General Manager, Dixon Sand
	Mark Dixon (MD)	Dixon Sand
	Melissa Mass (MM)	Dixon Sand - Ecologist
APOLOGIES	Jemma Roberts (JR)	Community Representative (alternate)
	Lisa Aylward (LAy)	Maroota Public School Representative

The meeting was held in accordance with COVID-19 directives, with social distancing, hand sanitising, etc. A health declaration was completed by all attendees.

<table>
<tr><td>WELCOME & INTRODUCTION</td><td>LA opened the meeting at 1.10pm following a light luncheon. All members were welcomed and the new Bush-It representative, Timothy Baker was introduced.</td><td></td></tr>
<tr><td>DECLARATIONS OF INTEREST</td><td>LA declared that she is approved by the Department of Planning and Environment to chair the meeting and engaged by Dixon Sand.
LA advised that TB has completed his pecuniary interest declaration & code of conduct forms.</td><td>No changes to previous declarations by members.</td></tr>
<tr><td>BUSINESS ARISING FROM PREVIOUS MEETING (13/5/20)</td><td>
<table>
<tr><th>Item</th><th>Issue</th><th>Responsibility</th></tr>
<tr><td>1</td><td>Follow-up response from Robyn Preston MP regarding the school zone (Complete – see correspondence report)</td><td>LA</td></tr>
</table>
</td><td>LA to continue to follow up response from MP.</td></tr>
<tr><td>CORRESPONDENCE (as emailed with Meeting Notice on 12/10/20)</td><td>

27/5/20 - Draft minutes sent to members for review
3/6/20 - Finalised minutes sent to members.
30/6/20 – Email from HC advising that Bush-Its representative on the CCC will now be Tim Baker (Managing Director). Forms sent through to him for completion and return.
2/7/20 – Email from TB with completed forms.
11/9/20 – Email from Chris Spraggon advising that he was leaving Bush-It. I responded to

</td><td></td></tr>
</table>

	Chris, thanking him for his contributions at our CCCs and wishing him all the best in his future endeavours. • 28/9/20 – Email from HC advising that the Annual Review 2019 – 2020 for the Old Northern Road and Haerses Road Quarries has been submitted to the DPIE. A website link to access the documents was provided. • 12/10/20 – Email to CCC members with the Meeting Notice, Agenda and Correspondence Report for this meeting. • 12/10/20 – Email to Robyn Preston MP, following up a response in relation to the school zone outside Maroota Public School. • 2/11/20 – Email to members confirming the venue for this meeting (Glenorie RSL). • 7/11/20 – Email to Robyn Preston MP seeking a response.	
PROJECT REPORT, INCLUDING PRODUCTION/SALES **OLD NORTHERN ROAD** **HAERSES ROAD QUARRY** **HAERSES ROAD QUARRY MOD. 3** **HAERSES ROAD QUARRY MOD. 4**	DD advised that sales have been healthy and steady with interest in logs. • Status of HR and WFR intersection upgrade to construct a channelised right-turn 'CHR' treatment is completed and awaiting RMS' final sign off. • Completion of extension of power to the proposed Processing Plant area • Completion of minimum 2 year groundwater monitoring of newly installed monitoring wells located within the 100m buffer zone to the MTSGS. • Extraction in Cell 1A (Mod 1 area) which commenced in December 2019 have been postponed. • Following from the formal response prepared for the submissions, Dixon Sand received a Request for Additional Information from DPIE in May 2020 • Dixon Sand responded to the RFI in late May 2020 by providing additional information regarding air quality assessment (as requested by EPA). • Current status – Proposed Modification under Assessment • Application for Modification 4 lodged on 7 October 2020 under Section 4.55(1A) of EP&A Act – minimal environmental impact. • Changing the sequence of approved extraction within the Mod. 1 Friable Hawkesbury Sandstone resource. • Approved Extraction Cells 1A and 2A ❖ Proposed Extraction Cells 1A and 1B (map shown and explained)	**Questions asked and answered throughout the presentation.**

ENVIRONMENTAL MANAGEMENT	The following documents were prepared and submitted to DPIE for review and approval: o Maximum Extraction Depth Maps o Rehabilitation Bonds o EMS and Management Plans o 2 year of Groundwater Monitoring Data within the MTSGS Buffer Zone at Haerses Road o Annual Reviews	
EPA VISIT	The EPA visited ONR and HR quarries mid June 2020 to undertake the 5 yearly risk assessment for the licensed premises.	
ENVIRONMENTAL MONITORING RESULTS	The presentation showed the: o Environmental Monitoring Locations o Environmental Incident o TEOM – PM10 data o Dust Deposition o Noise o Ground water; and o Surface water	**Maps accompanied presentation (see separate categories)**
ENVIRONMENTAL INCIDENT/NON-COMPLIANCE	Unplanned discharge over weir of main water channel at ONR: – Reported to DPIE and EPA – Cause of incident – Incident rectification / remediation – Formal warning in relation to breaches of EPL 3916. Details provided. Two non-compliance matters were advised in relation to conditions of approval for DA 250-09-01 and EPL 3916.	**See Slides 19 & 20**
TEOM DATA	TEOM and Meteorological station records PM10 levels and weather data such as rain, temperature, wind etc. **Monitoring Criteria** o Long term: Annual PM10 average (light blue line) should not exceed the annual average criteria (pink line – 30µg/m3) o Short term: 24hr PM10 average (blue bars) should not exceed the 24hr PM10 NEPM Criteria (yellow line – 50µg/m3) o Short term: If the 24hr PM10 EPL Criteria Level (green line – 42µg/m3) is exceeded by the 24hr PM10 average (blue bars), and the prevailing wind is from the specific quadrant Dixon Sand is required to: • Notify EPA • Take immediate action to reduce PM10 levels • Stop works if levels do not fall below 42µg/m3 within 1 hour o TEOM station represent the EPL Points 1 and 3. o PM10 data presented for July 2020 to September 2020. No PM10 exceedance recorded during this period.	**Graphs and colour coded data explained. (Slide 22)**

DEPOSITIONAL DUST DATA	Data and graphs explained for all sites for the monitoring period July 2020 to October 2020. ➢ Old Northern Road (D1A, D4, D5 & D7) ➢ Haerses Road (D8, D10, D11 & D12). No dust deposition exceedance recorded during this period.	**See Slides 23 - 32**
NOISE MONITORING	The noise monitoring program and data was explained for ONR & HR. Noise monitoring results demonstrated compliance with noise criteria.	**See Slides 34 - 37**
GROUND WATER MONITORING	GW Monitoring wells: – 11 x BHs at ONR – 8 x BHs at HR (original extraction in Tertiary Sand) – 13 x BHs at HR (new – 100 MTSGS Buffer zone for Mod 1 extraction cells GW level: monthly + continuous data loggers GW quality sampling & lab analysis: – 6 monthly sampling and testing (ONR and HR original bores) – Monthly quality sampling and testing (HR MTSGS 100m Buffer)	**See Slides 38 - 55**
SURFACE WATER MONITORING	ONR • SW19 = Surface water monitoring at creek on Lot 196 • LDP1 = EPL 3916 Licenced Discharge Point at Weir of Main Water Channel HR • SW1 = Surface water monitoring at creek east of extraction Stage 2 East (inside the Biodiversity Offset Area) • SW2 = Surface water monitoring at creek west of extraction Cell 1A (Mod 1)	**Graphs explained. See Slides 56 - 59**
BUSH REGENERAITON WORKS	TB advised that he hadn't been to the site for quite some time and was pleasantly surprised to see how remarkable the rehabilitation is. TB provided a comprehensive presentation of the rehabilitation and regeneration works undertaken on all sites: ➢ Native Vegetation Corridor ➢ Lot 1 ➢ Lot 2 ➢ Biodiversity Offset – Haerses Road ➢ Future works	**See Slides 60 - 67**
BIODIVERSITY AND REHABILITATION	MM Provided a comprehensive presentation on the Biodiversity and Rehabilitation annual report, monitoring results and threatened species update. Photographs and maps were shown and explained.	**See Slides 68 - 79**
GENERAL BUSINESS	o KM enquired whether auditing has been carried out through DPIE – DD advised that DPIE have only been involved with processing of the Annual Independent Environment Review and project Management Plans. EPA has attended the site, but this was not an audit.	

	o HC advised that LAy had informed her that the P&C had no issues to raise. o HC raised on behalf of Phil Acurso that he has had problems with trespassers using Crown Land to access his private property. People are going to the dams, taking photographs, having picnics and leaving rubbish, etc. He requested that Dixon Sand install gates where ONR meets the crown road. KM commented that this was up to the Crown. All agreed that this is a difficult issue. MD will speak with HC to discuss issue and options.	
MEETING SCHEDULE FOR 2021	It was agreed to continue to hold the meetings bi-annually with the same schedule: - Wednesday 12th May 2021, and - Wednesday 10th November 2021. On site at **12.30pm** with a light lunch, followed by the CCC commencing at **1pm.**	

The meeting was closed at 2.30pm with the chair thanking all members for their attendance and contribution throughout 2020 and wishing them a safe and happy festive season.

ACTION ITEM

Item	Issue	Responsibility
1	Follow-up response from Robyn Preston MP regarding the school zone	LA

DIXON SAND

MINUTES OF THE BI-ANNUAL
COMMUNITY CONSULTATIVE COMMITTEE
12 MAY 2021
GLENORIE RSL CLUB - GLENORIE

	NAME	ORGANISATION
PRESENT	Lisa Andrews (LA)	Independent Chairperson
	Kristine McKenzie (KM)	The Hills Shire Council Representative
	Robert Buckham (RB)	The Hills Shire Council Representative
	Pat Schwartz (PS)	Community Representative
	Farley Roberts (FR)	Community Representative
	Lisa Aylward (LAy)	Maroota Public School Representative
	Timothy Baker (TB)	Bush Regeneration Contractor (Bush-It)
	Hunny Churcher (HC) *via video-conference*	Environmental Officer, Dixon Sand
	David Dixon (DD)	General Manager, Dixon Sand
	Mark Dixon (MD)	Dixon Sand
	Melissa Mass (MM)	Dixon Sand - Ecologist
APOLOGIES	Jemma Roberts (JR)	Community Representative (alternate)

WELCOME & INTRODUCTION	LA opened the meeting at 12.58pm following a light luncheon. All members were welcomed and LA advised that HC was participating via video-conferencing.	
DECLARATIONS OF INTEREST	LA declared that she is approved by the Department of Planning and Environment to chair the meeting and engaged by Dixon Sand.	**No changes to previous declarations by members.**
BUSINESS ARISING FROM PREVIOUS MEETING (13/5/20)	**Item** / **Issue** / **Responsibility**: 1 — Follow-up response from Robyn Preston MP regarding the school zone (Complete – RP advised that she had made representations to Hawkesbury City Council) — LA PS advised that the issue of extending the length of the 60km zone at Cattai had been raised at a previous CCC and did not seem to have been addressed. LA to review. **Action – *see post script at end of these minutes.***	**Members advised that subject area is located in The Hills Shire Council LGA. LA to advise RP. Action.**
CORRESPONDENCE (as emailed with Meeting Notice on 14/4/21 with 5 additional items)	o 18/11/20 - Draft minutes sent to members for review o 19/11/20 – Email from HC to members advising of the approved Old Northern Road Quarry EMS & Management Plans from DPIE, which are available on the project website.	

	o 28/11/20 – Email to members with the finalised minutes. o 10/12/20 – Email from HC to members advising of the revised EMS and Management Plans as a result of the IEA. o 19/2/21- Email from HC advising that following a request for further information, Dixon sand has submitted an addendum to DPIE of its Old Northern Road Quarry's Annual Review 2019 – 2020 which is also available on its website (link provided). o 14/4/21 – Email to CCC members with the Meeting Notice, Agenda and Correspondence Report for this meeting. o 20/4/21 – Email to Email to Robyn Preston MP, following up a response in relation to the school zone outside Maroota Public School. o 20/4/21 – Email to members advising of the venue for this meeting (Glenorie RSL). o 22/4/21 – Email to DPIE with chair's annual report on the operations of the CCC from 2020-2021. o 4/5/21 – Email from Robyn Preston's office advising that they have made representations to Hawkesbury City Council and will be in contact when they receive a response. o 10/5/21 – Email to members with the reminder for this meeting.	
PROJECT REPORT, INCLUDING PRODUCTION/SALES OLD NORTHERN ROAD **HAERSES ROAD QUARRY** **HAERSES ROAD QUARRY MOD. 3** **HAERSES ROAD QUARRY MOD. 4**	DD advised that apart from wet weather, business and sales have been good for both sand and sandstone block operations at ONR and HR. o Status of HR and WFR intersection upgrade to construct a channelised right-turn 'CHR' treatment is completed and has been signed off by Transport for NSW o Completion of extension of power to the proposed Processing Plant area o Completion of minimum 2 year groundwater monitoring of newly installed monitoring wells located within the 100m buffer zone to the MTSGS. o Current status – Proposed Modification under Assessment o Application for Modification 4 lodged on 7 October 2020 under Section 4.55(1A) of EP&A Act – minimal environmental impact. o Changing the sequence of approved extraction within the Mod. 1 Friable Hawkesbury Sandstone resource. o Approved Extraction Cells 1A and 2A → Proposed Extraction Cells commencing in 1A and 1B.	**Questions asked and answered throughout the presentation.** **See Map - Slide No. 9**
ENVIRONMENTAL MANAGEMENT	The following documents were prepared and submitted to DPIE for review and approval:	

	o Rehabilitation Bonds o EMS and Management Plans o 2 year of Groundwater Monitoring Data within the MTSGS Buffer Zone at Haerses Road o Annual Reviews	
ENVIRONMENTAL MONITORING RESULTS	The presentation showed the: 1. Environmental Monitoring Locations 2. Incidents 3. TEOM – PM10 data 4. Dust Deposition 5. Noise 6. Ground water; and 7. Surface water	**1. See Location Maps in Slides: 11-14**
INCIDENT	Exceedance of PM10 air quality on 25-4-21 to 26-4-21 (Sunday/Anzac Day): – Reported to DPIE and EPA – Cause of incident was due to scheduled hazard reduction burns across the Greater Sydney and local areas, which are considered as extra-ordinary events. - The site was non-operational at the time	**See Slides 15-17**
TEOM DATA	TEOM and Meteorological station records PM10 levels and weather data such as rain, temperature, wind etc. **Monitoring Criteria** o Long term: Annual PM10 average (light blue line) should not exceed the annual average criteria (pink line – 30µg/m3) o Short term: 24hr PM10 average (blue bars) should not exceed the 24hr PM10 NEPM Criteria (yellow line – 50µg/m3) o Short term: If the 24hr PM10 EPL Criteria Level (green line – 42µg/m3) is exceeded by the 24hr PM10 average (blue bars), and the prevailing wind is from the specific quadrant Dixon Sand is required to: • Notify EPA • Take immediate action to reduce PM10 levels • Stop works if levels do not fall below 42µg/m3 within 1 hour o TEOM station represent the EPL Points 1 and 3.	**See Slides 18-19**
DEPOSITIONAL DUST DATA	Data and graphs explained for all sites for the monitoring period July 2020 to April 2021.	**See Slides 20-29**

	<table><tr><th>Location</th><th>Dust Gauge</th></tr><tr><td rowspan="4">Old Northern Road</td><td>D1A Access road</td></tr><tr><td>D4 Rehab area</td></tr><tr><td>D5 Bundwall</td></tr><tr><td>D7 Mullock Heap</td></tr><tr><td rowspan="4">Haerses Road</td><td>D8 Olive Grove</td></tr><tr><td>D10 Haerses Road (EPL Point 3)</td></tr><tr><td>D11 Receiver R6</td></tr><tr><td>D12 Receiver R8</td></tr></table>	
NOISE MONITORING	The 6-monthly noise monitoring program and data was explained for ONR (note HR currently requires annual monitoring if not quarrying in the new Mod 1 extraction cells). Noise monitoring results demonstrated compliance with noise criteria.	**See Slides 30-32**
GROUND WATER MONITORING	GW Monitoring wells: – 11 x BHs at ONR – 8 x BHs at HR (original extraction in Tertiary Sand) – 13 x BHs at HR (new – 100 MTSGS Buffer zone for Mod 1 extraction cells GW level: monthly + continuous data loggers GW quality sampling & lab analysis: – 6 monthly sampling and testing (ONR and HR original bores) – Monthly quality sampling and testing (HR MTSGS 100m Buffer)	**Graphs explained - See Slides 33-49**
SURFACE WATER MONITORING	**ONR** • SW19 = Surface water monitoring at creek on Lot 196 • LDP1 = EPL 3916 Licenced Discharge Point at Weir of Main Water Channel **HR** • SW1 = Surface water monitoring at creek east of extraction Stage 2 East (inside the Biodiversity Offset Area) • SW2 = Surface water monitoring at creek west of extraction Cell 1A (Mod 1)	**Graphs explained - See Slides 50-53**
BUSH REGENERATION WORKS	TB presented on the bush regeneration works: **Old nursery site & surrounds** Area intensively treated Feb – March to prevent Whiskey grass from seeding. Bare areas brush matted with seeding shrubs. The area is heavily compacted and would benefit from further revegetation to speed up the recovery process.	**See photographs in Slides 55 - 62**

	NVC – non topsoil section Recruitment and recovery witnessed is much slower with minimal microbial and mycorrhizal fungi. However minimal organic matter vastly reduces the ability of weeds to colonise. We have brush matted bare areas with seeding Acacias previously and now the area requires ongoing thinning of dense species i.e. Grevillea buxifolia and allelopathic canopy species. **NVC – filled section** Good growth of endangered plantings and excellent natural recruitment from seed bank. Only a very small amount of spot spraying along the edge has been undertaken targeting exotic grasses. Pampass and whiskey grass controlled recently. Thinning also required in this section to promote longer term diversity of species (Learning taken from Haerses road translocation.) **Lot 1** Recruitment on mass thanks to wetter than average conditions. We have mainly focused on targeting woody weeds such as Lantana and the occasional patches of Bridal Creeper. Exotic grasses targeted along edges. Predation from herbivores less evident now. **Lot 2** Mostly primary/secondary weed control of Lantana in this section. Open more degraded areas require revegetation with canopy species at the appropriate density in July-August. Recommend seed collection from site for future plantings in years to come. Intensive primary works scheduled for June – August. PS enquired that with all the rain is Bush-It keeping an eye on the Crofton weed. TB advised that they were. PS advised that eDNA water testing has found evidence of platypus in a number of sites on Cattai and Little Cattai Creeks. This indicates that they are present but not how well they are doing. Also noting that the koala population appears to be coming back. TB advised that he had seen white breasted sea eagles in the area. **Biodiversity Offset – Haerses Rd** Problematic species on disturbed edge next to access road predominantly. Relatively stable now with a dense buffer of competitive grasses and bracken fern.	

	Future works Bush-it looks forward to taking on further work to ensure the rehabilitation of sites and the maintenance of remnant ecosystems adjacent to Dixon Sand.	
BIODIVERSITY AND REHABILITATION	MM Provided a comprehensive presentation on the Biodiversity and Rehabilitation annual report, monitoring results and threatened species update. Photographs and maps were shown and explained. **Threatened Species Update** Biodiversity and Rehabilitation Annual Report 2021 o The Biodiversity and Rehabilitation Annual Report for 2021 will be completed in September. o The Annual Report identifies native flora and fauna within the Native Vegetation Corridor and the Haerses Road Biodiversity Offset Area, monitors the success of the rehabilitation area within the NVC and describes the current condition of threatened flora and their habitats within the Old Northern Road site and the HRBOA. o The rehabilitation areas are thriving and increasing in diversity and density. The overall biodiversity of the NVC and HRBOA is stable. Photographs were shown of the threatened species in the rehabilitation areas, ONR and HRBOA. Photographs were shown of fauna monitoring (micro bats): 10 bat species identified, 5 of them listed as threatened species via the NSW Biodiversity & Conservation Act. MM commented that bats pay an important role in the pollination process and also with controlling moths, etc at night. Photographs were shown of the *Melaleuca deanei* – Propagation: 23 larger sized plants. 25 smaller sized plants. Larger plants to be planted in May 2021 with smaller plants to be planted Spring 2021. **BCT Reporting** Annual Management Report for year 2 has been completed - Passive Management at Haerses Road and Porters Road.	**See Slides 63 - 70**
GENERAL BUSINESS	o TB thanked Dixon Sand for fixing up the access trails. o PS thanked Dixon Sand for the lunch.	

NEXT MEETING	Wednesday 10th November 2021. On site at **12.30pm** with a light lunch, followed by the CCC commencing at **1pm.**	

The meeting was closed at 2:01pm with the chair thanking all members for their attendance.

ACTION ITEM

Item	Issue	Responsibility
1	Follow-up response from Robyn Preston MP regarding the school zone	LA
2	Extending the length of the 60km zone at Cattai had been raised at a previous CCC and did not seem to have been addressed.	LA

Post Script for Action Item 2: *LA researched the previous minutes. This item was discussed at the extra-ordinary CCC held on 24 February 2020 – extract from minutes:*

- PS further commented that the Eastbend committee had raised the issue of speed around the Cattai School, specifically where the speed goes from 80km to 40km during school times (from O'Brians Rd to Millers Rd or Threlkeld Dr – both sides of the school). Discussions on whether the speed should go from 80km to 60km to 40km or whether more signage should be erected, warning drivers of the upcoming school zone (40km). DD mentioned that it may be difficult to alter a main arterial road from 80km to 60km, stating it would require a robust argument with supporting technical data. Notwithstanding this, Dixon Sand is committed to safety and driver conduct.

Listed as an agenda item for discussion at the next CCC (10/11/21).

Appendix K – Complaints Register

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
July 2020	0	3 Aug 2020
Aug 2020	0	11 Sep 2020
Sep 2020	1	6 Oct 2020
Oct 2020	0	2 Nov 2020
Nov 2020	0	1 Dec 2020
Dec 2020	0	4 Jan 2021
Jan 2021	0	1 Feb 2021
Feb 2021	0	1 Mar 2021
Mar 2021	0	9 Apr 2021
Apr 2021	0	11 May 2021
May 2021	0	2 Jun 2021
Jun 2021	0	2 Jul 2021
Total No. of Complaints	**1**	

Date Received	Contact Methodology	Dixon Staff Contacted	Issue	Recommended Action(s)	Date Actioned	Outcome / Future Action	Closed Out Date
02/09/2020	Email	Tom Watson (Weighbridge Operator)	• Complainant advised that they have witnessed a tipper truck driving in a dangerous manner and excessively over the speed limit. • Complainant had witnessed a truck driving up to 107 km/h on the Cattai Reserve straight. • Complainant had passed on the truck registration number to Windsor Police. • Complainant noted that the issue has been brought up and discussed in the local Maroota social media page.	• Notify Quarry Manager and/or Environmental Officer immediately • Request a copy of truck registration to check against Dixon Sand's customer haulage truck register and liaise with PF Formation and Hodgson Quarries in accordance with the Maroota Local Traffic Management Plan. • If the truck in question is confirmed to have picked up products from one of the three quarries, check if the truck has a previous offence(s) and notify the truck company as a formal warning. • Quarry Manager to execute appropriate discipline action. • If the truck in question has been verified to have picked up products from one of the three quarries, notify other truck drivers at the quarry of the nature of complaint / non-compliance and remediation action (privacy and identity of complainant and truck driver must be maintained).	03/09/2020 – 04/09/2020	• 02/09/2020 (6:32 am) – Tom Watson contacted the Complainant requesting a copy of the truck registration number in order to proceed with internal investigation. • 03/09/2020 (9:16 am) – Complainant provided a copy of the truck registration number. • 03/09/2020 (10:04 am) – Tom Watson confirmed with the Complainant that the truck in question does not match any truck on Dixon Sand's truck register. A copy of the Complainant's email has been forwarded to David Dixon (Quarry Manager / Director) who has contacted both PF Formation and Hodgson quarries and requested they check their truck registers. The Complainant was advised that they will be contacted once confirmation from the other two quarries are provided. • 03/09/2020 (7:25 pm) – Complainant replied and further expressed their concerns for the safety of road users. • 04/09/2020 (10:44 am) – Tom Watson informed the Complainant that the Quarry Manager received confirmation from both PF Formation and Hodgson Quarries that the truck in question is not associated with their quarries. Tom Watson reassured the Complainant that	04/09/2020

Date Received	Contact Methodology	Dixon Staff Contacted	Issue	Recommended Action(s)	Date Actioned	Outcome / Future Action	Closed Out Date
						had the truck have an association with any of the three quarries then appropriate action would be taken.	

Appendix L – Waste Register

Old Northern Road
Waste Tracking Register 2020-2021

Date	Waste Type	Amount	Measurement	Contractor	Disposal / Recycle	Receipt No
01/07/20 - 30/06/21	General Solid Waste - recyclable	13	cubic metre	Council Waste Contractor	Recycle	Council Rate
01/07/20 - 30/06/21	Genral Solid Waste - putrescible	78	cubic metre	Council Waste Contractor	Disposal	Council Rate
16/07/2020	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8805
01/07/20 - 30/06/21	Printer Cartridges	<0.5	cubic metre	Post Office Collection Bin	Recycle	N/A
17/07/2020	Waste Oil	2500	Litres	Southern Oil	Treatment	265895
30/07/2020	Grease	300	Litres	Greaseaters	Recycle	86500
18/08/2020	Non-putrescible	8	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8835
26/08/2020	Grease	300	Litres	Greaseaters	Recycle	86785
15/09/2020	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8853
21/09/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8856
22/09/2020	Grease	300	Litres	Greaseaters	Recycle	87026
25/09/2020	Waste Oil	1700	Litres	Southern Oil	Treatment	265745
21/09/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8880
20/10/2020	Grease	300	Litres	Greaseaters	Recycle	87296
2/11/2020	Scrap Metal	15.3	tonnes	Westland Metals	Recycle	unknown
6/11/2020	Waste Oil	1900	Litres	Southern Oil	Treatment	265131
11/11/2020	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8893
17/11/2020	Grease	300	Litres	Greaseaters	Recycle	87542
27/11/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8951
17/12/2020	Grease	300	Litres	Greaseaters	Recycle	87836
6/01/2021	Non-putrescible	6	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8963
20/01/2021	Grease	300	Litres	Greaseaters	Recycle	88058
29/01/2021	Waste Oil	900	Litres	Southern Oil	Treatment	265652
5/02/2021	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8975
15/02/2021	Grease	300	Litres	Greaseaters	Recycle	88322
19/02/2021	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8981
4/03/2021	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8992
15/03/2021	Grease	300	Litres	Greaseaters	Recycle	88536
18/03/2021	Scrap Metal	29.6	tonnes	Westland Metals	Recycle	WM-24670
8/04/2021	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	9009
13/04/2021	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	9015
14/04/2021	Grease	300	Litres	Greaseaters	Recycle	88955
12/05/2021	Grease	300	Litres	Greaseaters	Recycle	89175
12/05/2021	Grease	50	Litres	Greaseaters	Recycle	89213
18/05/2021	Non-putrescible	8	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	9031
4/06/2021	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	9039
24/06/2021	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	9047
9/06/2021	Grease	300	Litres	Greaseaters	Recycle	89310

Total	Scrap Metal	44.9	tonnes
	Non-Putrescible	62	m3
	Waste oil	7000	litres
	Council Putrescible	78	m3
	Council Recycle	13	m3
	Printer Ink Catridge	<0.5	m3
	Grease	3650	litres

Appendix M – RFS Meeting Minutes

Meeting with Maroota Rural Fire Brigade – August 2020

Date: 25/08/2020

Time: 10:00 am – 11:00 am

Attendees:

- David Dixon (DD) –Dixon Sand Quarry Manager / Director
- Peter Kazzi (PK) – Maroota Rural Fire Brigade Captain

Agenda:

- Annual review of bushfire mitigations and risk analysis with the local RFS representative.

Points for Discussion

- DD accompanied PK at both Old Northern Road and Haerses Road Quarries
- DD informed PK of the operational changes at both quarries
    - Old Northern Road
        - rock and block operation on Lots 1 and 2
    - Haerses Road
        - commencement of extraction in Cell 1A
        - intersection road upgrade works coming to completion,
        - erection of private power poles to Lot 216 which is the newly proposed location for a processing plant, amenities and truck loading.
- PK discussed that the bushfire danger season for this year will commence on 1st October 2020. Bushfire danger season in some areas in Northern NSW will commence a few weeks prior to this date.
- DD advised that the Quarry intends to acquire a new water truck for Haerses Road and will ensure a 'storz' fitting is installed for compatibility with RFS water infrastructure and appliances.
- DD discussed the locations of the static water supplies at both quarries:
    - Old Northern Road
        - drafting from water storage in Cons Hill
    - Haerses Road
        - drafting from 2 water storage locations – 1) Stage 2 Eastern Pit and 2) Stage 2 Western Pit
- DD advised that the location of the standpipe at Old Northern Road (currently used for filling the watercart) may be relocated in the future. If this is the case the local RFS will be notified.
- PK discussed that a number of Hazard Reduction burns are scheduled in the district.
- DD and PK agreed that:
    - the Bushfire Management Plans (BFMP) for both quarries have been reviewed and no change is warrant until the processing plant at Haerses Road is in operation.
    - both quarries remain low risk of bushfire due to quarry operations acting as a fire break, low risk of infrastructure catching fire.
- PK and the local Maroota RFS brigade still has possession of a key to Old Northern Road quarry's front gate. It the case of an emergency and if required, the RFS will have access to the quarry.

Action

Action	To Action By:
Nil	-